ARCHIVES OF OPHTHALMOLOGY.

A BACTERIOLOGICAL STUDY OF TRACHOMA, WITH REMARKS ON THE OCCURRENCE OF THE INFLUENZA GROUP OF BACTERIA IN CONJUNCTIVITIS.[1]

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IN 1902–4 I examined bacteriologically 120 cases of trachoma. I was led to do this, thinking that owing to the systematic school inspection the cases which applied for treatment were unusually early ones, and that with the method of forceps expression a larger quantity of material could be obtained for examination than had been possible for previous investigators. The study of the bacteriology of trachoma, moreover, has recently received a stimulus by the publications of L. Müller of Vienna.

Müller in an examination of trachoma in Egypt and Graz found an influenza-like bacillus in 59 out of 155 cases—more frequently in recent cases. He has never found this bacillus in non-trachomatous cases, and is inclined to regard it as the inciting factor in trachoma. Culturally and morphologically this bacillus cannot be distinguished from the influenza bacillus. Müller does not regard it, however, as identical with the influenza bacillus, as no other symptoms of influenza were present. Müller's bacillus has the following characteristics—Morphology: Very small, short bacilli, generally twice as long as they are broad;

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their outline is not sharp; rounded ends; they stain with difficulty, best with carbol-fuchsin; Gram negative. Culture: Exclusive growth on hemoglobin media, on which, after 24 to 48 hours, small, clear, dew-drop colonies appear, seen only with a magnifying glass. In the proximity of contaminating colonies, like those of the staphylococcus pyogenes albus, the colonies of the Müller bacillus are much larger. (This increase in development only occurs in the neighborhood of colonies of marked alkaline reaction.) This trait is also common to the influenza bacillus, and is spoken of, for short, as a form of symbiosis, though not with absolute correctness. In subsequent cultures threads are present. Animal experimentation was negative, while experimentation with the true influenza bacillus is variable (Lindenthal).

In the cases of trachoma which I examined, the symptoms had generally not been sufficient to draw attention to the lids. On examination the upper and lower retrotarsal folds were found thickly studded or diffusely infiltrated with follicles, which in some cases encroached upon the tarsus. There was very little secretion, though generally a history of the lids being closed in the morning was elicited. The conjunctiva seemed but slightly thickened and moderately red.

I should like to add here that clinically these cases have been regarded by many ophthalmologists to be relatively benign and the measures used for their compulsory treatment unnecessarily severe. Though many of these cases were mild and amenable to treatment, I was able to follow two cases which notwithstanding treatment proceeded to the infiltration of the tarsal conjunctiva, presenting the rough thickened appearance which we know precedes the pannus and the other deleterious after-effects of trachoma. I think that we must recognize a variation in the intensity of the trachomatous process, possibly due to a variable toxicity and to other—especially hygienic—factors.

During the first winter, the follicle contents obtained by expression from 80 cases were examined. Though this has been done before by careful investigators with negative re-

sults, it seemed to me of promise from the above-mentioned reasons, and from the fact that with the method of expression—as the conjunctiva was not cleansed in any way, the infecting agent might be detected, even if only present in the conjunctival discharge or in the epithelium.

BACTERIOLOGICAL EXAMINATION OF THE FOLLICLE CONTENTS.

The follicle contents were thinly spread on cover glasses and stained in many ways for bacteria. Clear pictures were very difficult to obtain on account of the great quantity of cellular elements present. The best results were given by: (1) overstaining with Loeffler's methylene blue and decolorizing with dilute acetic acid; and (2), by the Weigert-Gram method. In general this examination was negative.

In the first series of investigations, the follicle contents were directly streaked with the roller forceps on agar, glucose agar, ascitic agar (ascitic fluid $\frac{1}{3}$, agar $\frac{2}{3}$), and hemoglobin agar (human blood from the finger). Colonies of the s. p. a. and xerosis bacillus developed (excluding manifest contaminations).

In the second series, the follicle contents were first transferred to broth tubes and placed in the incubator; after 3–24 hours, they had become clouded. Streaks and pour plates were then made, but were all quickly overgrown by the s. p. a.

In the next series, the follicle contents were carefully triturated, either with a blunt platinum wire on the side of the test-tube or in a sterile watch-glass or mortar, and the emulsion was streaked on the above media and pour plates were made. Besides the s. p. a. and xerosis bacillus, in four cases very small dew-drop colonies appeared on about the third day, which did not enlarge in size. Transplantation was only successful on hemoglobin media. Two series of the organisms have been cultivated to the sixth generation by frequent transplantations on hemoglobin agar. Control plants on serum agar were always negative. Morphology: short, thin bacilli. The pour plates showed s. p. a. colonies

and particles of tissue which did not change. A more fluid medium was tried, consisting of ½ % agar and 5 % gelatine with pepton, glucose, and meat extract of neutral reaction. These plates were rapidly spread over by the s. p. a.

In brief, the follicle contents were examined by many staining methods and cultivated on a large variety of nutrient media, with the only noteworthy result that in four cases an influenza-like bacillus was found.

BACTERIOLOGICAL EXAMINATION OF THE CONJUNCTIVAL DISCHARGE.

During the past winter I have continued the investigation especially with a view of testing Müller's results. Only the conjunctival discharge was examined in forty more or less recent cases of trachoma (no scars), and with the use of a hemoglobin-containing medium. In these I found the influenza-like bacillus in four. Two of the series have been kept alive for eight months by frequent transplantations on hemoglobin agar. Control transplants on serum agar were often made.

This influenza-like bacillus, which was therefore found in eight cases, presented the following characteristics: small size, rounded ends, difficulty of stain—best with diluted carbol-fuchsin. Grows only on hemoglobin media as small dew-drop colonies scarcely visible to the naked eye. The culture can be continued indefinitely on proper media. At no time does a growth take place on serum agar. The bacilli were found to be non-pathogenic for rabbits, and subconjunctival injections in rabbits have produced no lesion whatever.

It is evident that this bacillus agrees in every way with the one described by Müller, and which he has called the trachoma bacillus. In the rest of this paper I shall for brevity also make use of this name to signify an influenza-like bacillus found in some cases of trachoma.

Among the cases of trachoma examined, some were complicated with acute epidemic conjunctivitis. The Koch-Weeks bacillus was present, but I never found the Koch-Weeks and Müller bacillus together. The cases in which the Müller bacillus was found presented no clinical peculi-

arities. One of the most interesting presented the typical clinical picture of "acute trachoma." In this case I found the greatest number of Müller organisms.

ON THE OCCURRENCE OF INFLUENZA-LIKE BACTERIA IN THE CONJUNCTIVA.

I wish now to go over to the second part of my paper which deals with influenza-like bacilli encountered in conjunctivitis. There are a number of bacilli which resemble the influenza bacillus, so that some authors speak of an influenza group. This group, as far as the conjunctiva is concerned, may be said to be composed of the influenza bacillus, the pseudo-influenza bacillus, and the Müller bacillus, if we accept Müller's statement in regard to this last organism. The Koch-Weeks bacillus is regarded by some to be so similar to the influenza bacillus as to be identical with it—Kamen, Rymovitsch, Jundell; the opposite view is held by Zur Nedden, Axenfeld, Müller, Morax. I shall endeavor to show what we know of these organisms in conjunction with their appearance in conjunctival lesions.

The Koch-Weeks Bacillus: The cultural peculiarities of the Koch-Weeks bacillus, the well-recognized infectious agent of acute epidemic conjunctivitis, have recently been studied, especially by Morax, Weichselbaum and Müller, and Kamen. I have examined more than thirty cases and can but confirm the description given by these authors. The bacilli in cover-glass specimens present a characteristic picture, especially if they are stained with diluted carbol-fuchsin for not less than ten minutes. The extremely sharp outline, the length as compared to the breadth, is sufficient for identification. Morax even believes that culture is unnecessary and misleading, from the possible superabundant growth of a saprophyte masking the real inciting organism. I have found that the organism grows best on serum agar (ascitic fluid $\frac{1}{3}$, agar $\frac{2}{3}$). The colonies are small, clear, watery, opalescent, and visible to the naked eye. No tendency to confluence. "Symbiosis" well-marked. They grow on hemoglobin agar—the colonies are then smaller, clearer, and more watery—but the growth is not so profuse

as on serum agar. It is a most susceptible organism and extremely difficult to keep alive. I did not succeed in maintaining the growth beyond the third or fourth generation.

Morphologically it is easily differentiated from the *xerosis bacillus* by the Gram stain, which decolorizes it, and in cultures the colonies can be at present readily distinguished, as the xerosis colonies after a few days present a characteristic corrugated, leaf-like appearance. A word as to the xerosis bacillus. This non-pathogenic bacillus of the diphtheria group is a constant inhabitant of the conjunctiva and has long ceased to be regarded as having any pathogenic importance. It also grows best on serum agar. Its growth is retarded on hemoglobin agar and is scanty on plain agar, thus resembling the Koch-Weeks bacillus in the choice of media.

The Influenza Bacillus: The influenza bacillus has been found in some cases of conjunctivitis (Zur Nedden, Morax, Jundell), frequently associated with influenzal infection of the respiratory passages. Jundell published a series of conjunctivitis cases in patients suffering from influenza of the upper respiratory passages. Zur Nedden has also observed cases of conjunctivitis where the influenza bacillus was obtained on bacteriological examination. In eight out of thirteen cases other signs of influenza were present. The conjunctivitis in all of these cases was mild and without the presence of follicles. I recently examined bacteriologically a severe case of pseudo-membranous conjunctivitis in an infant where both corneæ were involved, and found a typical influenza bacillus. There was no evidence of trachoma. No other manifestations of influenza were present. This organism was non-pathogenic for the rabbit.

The Pseudo-Influenza Bacillus: Pfeiffer, the discoverer of the influenza bacillus, also described a pseudo-influenza bacillus which he found in the pneumonias of children not of influenzal origin. The pseudo-influenza bacillus has also been found by Kossel and Hartmann in the otitis media of sucklings. The characteristics which are supposed to differentiate it from the influenza bacillus are that it is somewhat

larger, and in subsequent generations on artificial media is more apt to produce degenerative forms (threads). These involution forms have been shown (Zur Nedden) to depend on accidental factors and are influenced by modification of the culture media. It is non-pathogenic for animals.

As the pathogenicity of the true influenza bacillus for animals is very uncertain, we must conclude that in the present state of our knowledge we cannot distinguish between these organisms, namely, the influenza bacillus, the pseudo-influenza bacillus, and the Müller "trachoma bacillus."

I have compared a true influenza series from a clinically well-marked case of influenzal pneumonia with the apparently genuine influenza bacillus obtained from the above-mentioned case of conjunctivitis without other influenzal manifestations, and with the Müller organism obtained from cases of trachoma. The morphology was the same, the cultural conditions were the same, and animal experimentation was negative in all.

If the absence of other clinical signs of influenza excludes a true-influenza infection, my severe case of pseudo-membranous conjunctivitis must be regarded as a pseudo-influenzal infection. On the other hand, do we not in the conjunctiva find pneumococcic and diphtheritic infections without systemic involvement? Zur Nedden (l. c.) described five cases of primary influenzal conjunctivitis. Müller, as Zur Nedden has correctly pointed out, has overlooked the fact that the influenza bacillus can cause conjunctivitis, and he has not been able to show that his bacillus is not identical with the influenza bacillus. It is therefore most probable that in my 8 cases out of 120, and in the many cases of Müller where this influenza-like bacillus was found, the presence of this micro-organism was accidental and independent of the inciting agent. This I think is especially shown by the case of clinically "acute trachoma" previously mentioned, where these bacilli were present in such abundance, as at the present day acute trachoma is always regarded as a mixed infection.

The Koch-Weeks bacillus is surely not identical with the

influenza organism. Morphologically it is larger and more sharply defined. Its cultivation succeeds best on serum agar, but it grows on human hemoglobin agar, while the influenza bacillus requires hemoglobin-containing media. The colonies in the cultures show distinct differences: the Koch-Weeks colonies are opalescent and bluish, while the influenza colonies remain transparent and like dew-drops. The Koch-Weeks bacillus is kept alive with great difficulty, while the influenza organism can be easily cultivated for an indefinite time.

My conclusions are as follows:

1. An influenza-like bacillus identical with the Müller "trachoma bacillus" was found present in 8 out of 120 fresh cases of trachoma which I have examined. It was present in the greatest numbers in a case of clinically "acute trachoma."

2. This organism could not be differentiated from the true- or pseudo-influenza bacillus—morphologically, culturally, or by animal experimentations.

3. It seems probable that its presence in these cases of trachoma was accidental.

4. There is an influenzal conjunctivitis without other manifestations of influenza.

5. The Koch-Weeks bacillus is not identical with the influenza organism.

BIBLIOGRAPHY.

KAMEN. *C. f. Bakt.*, 1899, vol. xxv., p. 401.

RYMOVITSCH. *Wratsch*, No. 20, p. 683, 1900–1901, quoted from Axenfeld in Kolle and Wassermann.

JUNDELL. Influenza Conj. bei Säuglingen. *Mittheilungen aus der Augenklinik Stockholm*, vol. iii., 1902, p. 11.

ZUR NEDDEN. *Klin. Monatschr. Augenklinik*, January, 1900, vol. xxxviii., p. 173; vol. xli., 1903.

MORAX and BEACH. ARCHIVES OF OPHTH., vol. xxv., p. 54.

L. MÜLLER. *Arch. f. Augenhlk.*, vol. xl., 1900, p. 13; *Graefe's Arch.*, vol. lvii., 1903, p. 138.

AXENFELD. Ergebnisse, Lubarsch and Ostertag, 1895–1899. *Handbuch path. Mikroorg.* Kolle and Wassermann, vol. iii., p. 512.

KNAPP, ARNOLD. Severe pseudo-membranous conjunctivitis in an infant, presumably due to the influenza bacillus. ARCHIVES OF OPHTHALMOLOGY, vol. xxxiii., p. 386.

AN UNUSUAL DILATATION OF THE SUPERIOR TEMPORAL ARTERY AND VEIN OF THE RETINA.

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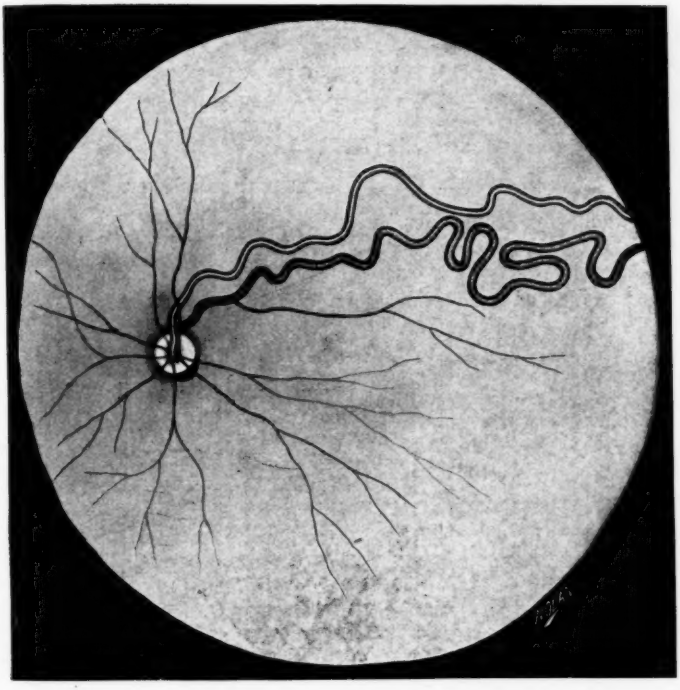
(*With one drawing on Text-plate XVIII.*)

On October 7, 1899, H. H. C., æt. fifteen, was brought to my office by the late Dr. Payne of this city. The boy gave a history of having had head and eye trouble for three or four years, the symptoms being aggravated by prolonged close work. His symptoms were those of asthenopia, with blurring at times; pain in eyes, forehead, and especially under the eyes, not of a marked character, however, and never incapacitating him from school work. The boy was a slim but well developed youth for his age, and had never been sick. An examination showed his vision normal in each eye, there was no muscular insufficiency, but low H. astigmatism with the ophthalmometer. The ophthalmoscope showed the right eye normal in every respect, and the left also, with the exception of the condition described below. Both eyes showed a low hyperopia. On the 31st of December, 1899, the eyes were examined under atropine, when the following conditions were noted: The full refraction of each eye was 1.00 D, hyperopia, this glass giving a vision of $\frac{6}{6}$ in each eye. The ophthalmoscope gave in detail the following condition of the left eye: The disc was good size, with a small pigment crescent on both the outer and inner side; there were some retinal striations; the vessels were all of good size and normal in distribution, with the exception of the superior temporal artery and vein. Beginning at the point of emergence, from near the centre

of the disc, both of these vessels were greatly enlarged, being fully three or four times as great in diameter as the other vessels, and becoming more and more tortuous as they extended toward the equator of the eyeball, or in fact as far toward the periphery as they could be seen with the pupil dilated ad maximum. The vessels were of uniform calibre throughout their entire course. Adjacent to the vien in two or three of the loops were small dense black pigment deposits, and in one loop there was a small roundish patch of apparent choroiditis. There seemed to be a slight accentuation of the coloring in the neighborhood of the vessels, but nothing of a pathological significance. We could find no reason in the eye itself for such a condition. Glasses, + 0.75 D, each eye, were prescribed and he was directed to go on with his usual school work. The patient was again seen on March 31, 1904, when a careful examination was made with a fully dilated pupil. So far as could be determined, no changes had taken place in the eye-ground since the former examination more than four years before. The young man had been in school continuously, and is now doing full college work at Oberlin College. He had only slight asthenopia, occasionally headache, etc., but no special symptoms referable to this eye.

The accompanying drawing was made by Mr. Nolan and is a very good representation of the condition present. By careful enquiry I ascertained that when about eight years of age the patient had fallen, striking his head on the sharp edge of a plank, producing a wound requiring three stitches to close. Now there is a distinct scar, beginning at a point 1*cm* above the external canthus, directly over the edge of the orbit, and extending downward and outward 2-5*cm*, terminating over the malar bone. There was no recollection on the part of the patient, however, of the eye having been injured at the time, nor is there now any external evidence of injury having taken place in the eyeball. It is possible that by this accident some injury may have taken place involving the ciliary region, but my own judgment is that other and more marked symptoms would have occurred in connection with the eye itself at the time of the accident as well as subsequent to it, if this had been the cause of the trouble. I cannot but think that there has been some con-



genital defect as the real cause of the difficulty, the developmental forces in the prenatal stages producing so uniform and regular enlargement of these vessels.

Practically all the references I find in literature regarding extremely enlarged vessels have to do with inflammatory conditions, where there is either a regular dilatation of the entire vessel or where portions of the vessels alone are the seat of the enlargement. One might imagine a slow-growing neoplasm in the region of the ciliary body as possibly tending to enlargement of vessels supplying this region, but then a period of four years ought to give some evidence by some change in the condition of either the external or internal portion of the eyeball, if such were the cause of the difficulty. It is much more reasonable to suppose that a condition of inflammation existing in the fœtal state might tend to produce an enlargement of the vessels which would go on throughout life without leading to any more serious consequences, than to suppose that any inflammatory condition due to accident or other cause could lead to a uniform dilatation of the vessels without producing more positive evidence of its presence in the external appearance of the eye or in the internal condition as viewed with the ophthalmoscope. At all events, so far as the ophthalmoscopic picture is concerned, I have found nothing similar, and it seems to me worth while to put it on record.

ADENO-CARCINOMA OF THE EYELID.

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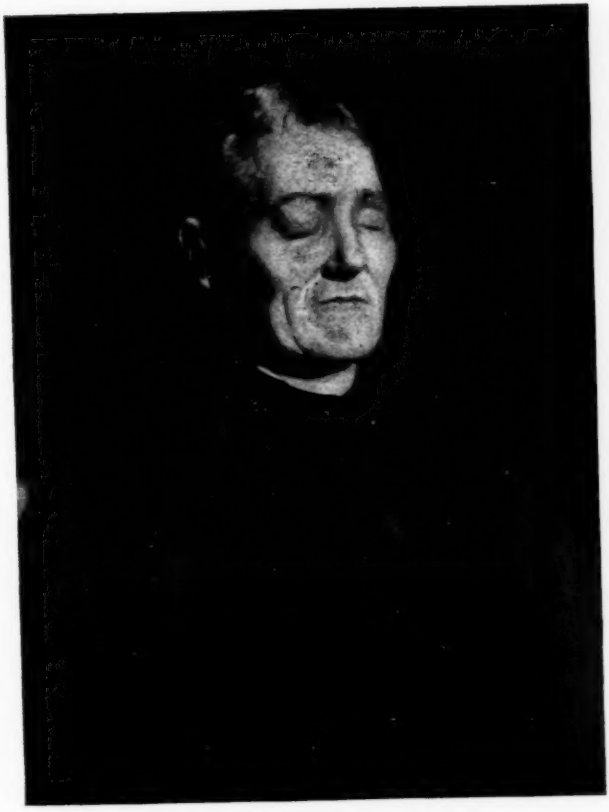
(*With Text-plates XIX. and XX.*)

As Fuchs observes, in consideration of the complicated structure of the lids, in which such manifold variety of tissues takes part, it is not surprising that the most dissimilar kind of tumors should at times come under observation.

Among the rarer forms of neoplasm is adenoma, which may originate in any of the various glandular structures of the lid: the sebaceous glands, the glands of Moll (modified sweat glands of the lid margin), those in the tarsus, the Meibomian glands, the acino-tubular glands of Krause; and in the tarsal conjunctiva are certain follicular cavities called the glands of Henle.

The adenomata of the Meibomian glands, of the tarsal glands of Krause, and of the glands of Moll have been thoroughly described by Dr. Maximilian Salzmann.[1] He does not, however, mention any cases in which the adenoma underwent carcinomatous degeneration. As Stellwag[2] states: "A great variety of tumors are combined with carcinoma from the outset or during their progress assume its characteristics more and more." There are only three cases of adeno-carcinoma of the lid found in the literature. This is what took place in the case which came under my observation at the Vanderbilt Clinic, October 17, 1900.

Bridget G., aged forty-five, had a large tumor, involving the entire right upper lid. She states that two years previous she went to the Brooklyn Eye and Ear Infirmary where two growths,



the size of beans, were removed. These swellings were painful and gave considerable discomfort. Soon after the operation she noticed another little "lump" on the top of the lid, which was followed by others.

These nodules developed gradually at first, some coalescing and forming larger masses, which continued to increase in size or form in other parts of the lid, until the entire eyelid was involved.

At her first appearance at the Clinic, it had attained the following dimensions: Length, from outer to inner canthus, one and seven-eighths inches; width of lid from ciliary margin to eyebrow, one and one-half inches; thickness at centre from skin to mucous membrane, one-quarter inch.

The outer surface presented a hard, irregular, nodular appearance, with numerous elevations and depressions. The cutaneous covering was closely adherent and of a reddish-yellow color. The protuberances were in places smooth and glossy, in other parts shrunken and rough. The inner mucous surface appeared excavated and also covered by nodules in parts; other portions seemed indurated. There were numerous furrows covered by a yellowish secretion (see Text-plate XIX).

The cornea presented the appearance of a vascular keratitis or a trachomatous pannus, with numerous small ulcers.

History of Patient.—Is married; had childhood diseases; menstrual history is regular, rheumatism negative, chills and fever thirty years ago; suffered with severe headaches frequently during past five years; had one miscarriage, otherwise the patient was fairly well. Has two children living, two died of summer complaint; indefinite tubercular history.

The patient was advised to have the tumor removed immediately and told it might be necessary to also remove the eyeball. She refused an operation, so was kept under observation.

Dr. H. Knapp had seen the case and immediately diagnosed it as adenoma, most likely from the Meibomian glands; and a small piece, which was removed from the inner surface and examined microscopically, verified this diagnosis.

At this time there was no glandular involvement. When next she reported, over three months later, the nodules, especially those near the inner canthus, had increased considerably in size and the entire lid had become more swollen and inflamed. The lymphatic glands in the region of the parotid gland, and of the

angle of the jaw (Knapp) in particular, which are connected by the lymphatic vessels with the globe, began to enlarge, and finally those in the neck. When this glandular development occurred, the patient was again told that an operation was imperative, and in fact might then be too late to prevent systemic infection.

A small piece was again removed from the inner surface of the lid, and the microscopic examination was kindly made by Dr. Larkin of the Pathological Department of the Vanderbilt Clinic. His report shows the tumor to have undergone cancerous degeneration.

The patient finally consented to the operation—that is, to the removal of the lid, but not the eyeball. She entered the New York Ophthalmic and Aural Institute (January 15, 1901). Æther narcosis. An incision was made along the upper margin of the lid, parallel to the eyebrow and about 5 millimetres distant. A very small part of the outer part of the lid was not involved in the growth, so I made a careful dissection downwards in the hope that I might also save some of the lower border of the lid and tarsus, in order to perform a blepharoplasty and thereby protect the eyeball. After this flap had been detached, I attempted to dissect the central portion and lower margin, but found the skin not alone closely adherent to the growth but even involved in the diseased process, and impossible of dissection, as it tore at the least effort.

A close examination of the entire lid from canthus to canthus showed it to be one mass of nodular growths, with not a particle of unaffected tarsus or mucous membrane, as it had undergone the same destructive process, except a small margin of skin at the canthi; so it was absolutely necessary to remove the entire lid. Wound healed without any trouble, and the patient with an effort could almost cover the eye with the flap of skin that was left above and on the side.

Pathological Examination, Section of Upper Lid (see Text-plate XX).—Some of the Meibomian glands in the section are normal. In other places there is a marked round-cell infiltration of the connective-tissue stroma between the glands. Finally there are masses of epithelial cells packed in alveoli of irregular shape and size,—some round or oval, other elongated and band-like. Many of the cells show karyokinetic figures in their comparatively large nuclei and are more or less cuboidal in shape. Some of the small lymph vessels in the stroma contain epithelial

cells in small numbers. Round-cell infiltration is profuse and marked in the stroma. Some small blood-vessels contain hyaline thrombi.

Diagnosis: Carcinoma of the Meibomian glands.

I kept the patient under observation in order to watch the glandular development. I advised her to have them removed, but she delayed it until there was a complete chain of glands from the outer canthus to the angle of the jaw. I finally persuaded her to go to the Roosevelt Hospital where she consulted Dr. Jos. Blake, on March 19, 1901. His report is as follows: Examination of the right eyelid shows it to be cicatrized, contracted, and roughened, conjunctiva red and inflamed, the cornea opaque and roughened.

Several elliptical, glandular enlargements extending in a chain from the angle of the eye across the temporo-facial region, downward in front of the ear and along anterior border of the stylo-mastoid as far as the cricoid cartilage. These glands vary in size and are movable, not tender, and not attached to the skin.

Pathological Report.—Carcinoma; operated on by Dr. Blake: Partial excision, ligature of the external carotid artery. The upper glandular enlargements are first surrounded by an elliptical skin incision, which is deepened to the temporal fossa, excising quite an extensive involvement of the temporal fascia. Hemorrhage quite marked. The incision is then carried downward and forward behind the ramus of the jaw, over the glandular enlargements to the hyoid bone. Below it is deepened and part of the glands (superficial) dissected out and removed. It is found on palpation that the deep glands are involved, the process extending posteriorly beneath the stylo-mastoid, involving the muscular tissue and the cervical plexus of nerves.

It is considered unadvisable to attempt to remove the diseased tissue. By careful dissection the external carotid artery is cleared. It is ligated about one-fourth of an inch above the bifurcation, together with several of its branches, *i. e.*, superior thyroid, lingual, facial, and occipital. In each case the arteries are resected between strong ligatures. Wound irrigated with salt solution and then closed. The elliptical piece of skin together with the subjacent enlarged glands excised from upper fourth of wound. Skin is then closed with interrupted and continuous silk sutures. Wound healed well, though with considerable pain in the face. Discharged April 7, 1901.

Dr. H. Knapp[3] reported a case which came under observation at the same time as mine.

"A tumor of the right upper lid, in a woman forty-eight years of age. The upper lid was thickened, and partly coarsely and partly finely nodular; the skin was normal, thin, elastic, and movable over the tumor. The substance of the latter had the hardness of cartilage, was mostly of a peculiar yellowish white color, not unlike old ivory. The yellowish nodules shone through the skin, having replaced the orbicular muscle. On turning the lid, it was clear that the whole mass was an aggregation of hypertrophied Meibomian glands—the bunches of acini around the larger duct, themselves again dividing into secondary and tertiary bunches, reproducing a picture of the normal glands, which, from uniform resistance from the eyeball, presented an even surface. On the inner surface, this lack of vascularity was more conspicuous than on the outer. The degeneration was not uniform over the whole tarsus, but more pronounced in some places than in others, forming little tumors projecting over the others. At different times I excised those that were most pronounced. This did not improve the condition as the neighboring portions grew slowly and occupied the place of others.

"About a year ago I removed a larger piece of the outer part of the lid, nearly one-third the whole mass, yet left so much at the inner surface (which was less involved than the outer and still covered with healthy conjunctiva) as to separate the lid and protect the cornea. The relief was only temporary. Seeing that the growth of the tumor was irresistible, I removed radically the whole mass, June 5, 1901. The entire tarsal portion of the upper lid was taken away, which left only a narrow strip of skin and mucous membrane behind. The mass was rigid and curved. On looking at it from below it projected over the healthy cornea, like the stiff curved vizor of a helmet. In order to protect the cornea, I pared the outer half of the free margin of the lower lid and stitched it to the upper. Furthermore, I kept the lower lid over the cornea, and stitching it to the upper without paring its margin thus obtained firm organic union between the two lids. Up to October 18, 1901, there has been no relapse."

This case was very interesting and instructive, showing repeated recurrences after frequent removals of the growth

and still preserving its benign character and no glandular involvement.

In the three cases from Fuchs's clinic reported by Salzmann,[1] the three different glandular structures were involved. In the first, the adenoma originated in the Meibomian glands, the growth involving two-thirds of the lid. The principal feature, clinically, was its benign character, though its growth was rapid and extensive and there was no involvement of the lymphatic glands.

The adenomata of the glands of Krause and Moll were also of a benign character. In the latter there was also some cystic degeneration, but in none of these cases was there any carcinomatous degeneration.

The other cases reported are as follows :

Adenoma of the Meibomian Glands, by Rumschewitsch.[4]

Man, twenty-four years old, had on the right upper lid, 4*mm* above the free border, a tumor the size of a pea. It was quite soft and adherent to the tarsus. The skin of the lid was freely movable over it. After everting the lid no pale spot was seen in the conjunctiva of the lid, he therefore removed the growth through an incision in the skin. A microscopical examination showed that the inner portion of the tumor was composed of ordinary tarsus, which contained acini of the Meibomian glands. In the anterior portion there was a form of connective-tissue meshwork, in which bundles of striated muscles were found. Between the fibres of the connective tissue were many flat cells. The meshwork was filled up with fields of various sizes and forms; the larger ones were of a circular shape, and, as regards their size, were smaller than the acini of the Meibomian glands. The others had a long or rather cylindrical form. All these fields consisted entirely of epithelium. Some of the round cells were distinguishable from the acini of the Meibomian glands only in that the periphery contained not only one or two but several layers of cylindrical, cubical, or round cells. In the centre were innumerable cells transformed into fat. These cells were mostly in the periphery of the neoplasm. In the centre, on the contrary, the round fields appeared much smaller, and in the centre of the latter none of the cells were found to have changed into fat, but instead there were round cells, but no lumen was visible. In the

thickest part of the tumor was found a very much flattened execretory duct which possessed a very narrow canal. These walls were in close connection with the round cells, which can be distinguished from the acini of the Meibomian glands only in that the fatty degenerated cells were only in the centre or there were none at all.

Adenoma of the Glands of Krause.

A. S., a healthy man, thirty-four years old, noticed in the last four years a gradually increasing swelling on the right upper lid, near the outer canthus. The right palpebral fissure seemed somewhat narrowed, especially at the outer half. The upper border of the tarsus was thickened at the outer half and appeared as a well-marked swelling, sharply defined from the rest of the tarsus. It is closely adherent to the tarsus but the skin is freely movable over it. It is more than 1*cm* long. A very gradual growth of the neoplasm indicates its benign character. Taking into consideration the location of the neoplasm, it probably originated in the glands of Krause.

Upon everting the lid, the conjunctiva was shown to be unaffected. The growth was removed by an incision in the skin. The growth upon microscopical examination was sharply defined from the rest of the tarsus but was not encapsulated. It consisted of adjoining fields but separated by septa which were thicker than the fields themselves. These fields consisted of cylindrical epithelial cells whose wider base was directed towards the periphery, the apex towards the centre. The nuclei were in the thick cellular parts near the periphery. The septa consisted of typical granulation tissue. The epithelial fields of the lower half of the growth differed from the upper half only in that the latter consisted entirely of round cells, whereas the former were of round and cylindrical cells. The epithelial cells retained always their cylindrical form and their nuclei were always located near the periphery. The stroma was entirely of granulation tissue, only in a few places was found compact fibrous connective tissue.

Adenoma of the Sebaceous Glands.

S. C., twenty years old. On the right under lid, external to the tear duct, was found a growth the size of a small bean. Had

been noticed growing four years, was closely connected with the skin and tarsus and was therefore immovable,—of pale yellow color, and quite hard. The transverse section shows that the skin on the anterior surface is closely adherent to the growth. At the place of adhesion only the papillæ of the skin are seen. The sweat glands and even the fine hairs are entirely absent. The layers of the skin are thickened and a few enclosed blood-vessels form a capsule for the growth, from which several off-shoots appear, also containing blood-vessels. These processes form a thick network, whose meshes are filled with epithelial cells. These are of various sizes, but appear always round. The lumen could not be found in the gland tissue.

Adenoma of the Modified Sweat Glands (*Waldeyer*).

J. B., twenty-five years old, had a warty growth on the upper lid, external to the tear duct, observed for a year. It is of a pale red color, 2½*mm* long, 1*mm* wide, 1.5*mm* thick. The growth was removed together with a thin layer of the surrounding tissue. A microscopical examination showed the same character of growth as the previous case, but originating in the sweat glands. On the lower surface of the growth, several canals were observed which were considered to be orifices of the excretory duct of the modified sweat glands of the margin of the lid, as the tumor was between the cilia and the layers of the Meibomian glands. The sebaceous glands, whose orifices were united with those of the Meibomian glands, were not to be seen. The rest of the mass of the tumor up to the papillæ of the free-lid margin consisted entirely of gland tissue.

Fuchs,[8] in his very interesting and exhaustive article on chalazion and rare tumors of the lid, mentions the following cases:

Adenoma of the Sweat Glands.

A movable growth 1*cm* large. The hair follicles are completely surrounded by the neoplasm. The sebaceous glands almost completely atrophied. Two forms of cylindrical cells were found in the transverse section. The original, filled with cylindrical epithelium; and the newly formed, with flat epithelial cells.

(2) *Adenoma of the Sebaceous Glands.*

On the right upper lid was a growth, the size of a pea, which was divided into two parts, externally surrounded by a capsule, from which numerous septa radiate and penetrate into the neoplasm. The acini consist of epithelial cylinders, which are destitute of a lumen. In their build they are similar to the sebaceous and Meibomian glands, only they have no lumen. It was difficult for Fuchs, however, to decide on the exact origin of the growth.

Rumschewitsch also refers to a case of Baldauf[6]:

A woman, of fifty-nine years, had a growth of four years' duration, involving two-thirds of the tarsus of the right lower lid. It attained such a size that the palpebral fissure seemed completely displaced. It bled on pressure, and the furrows were covered with yellowish secretion. A microscopic examination showed a complex cellular formation, enclosed in a connective-tissue stroma. The muscular fibres of the orbicularis were partly in a fatty and partly in a hyalin state of degeneration; very little could be seen of the tarsus. The examination showed it to be an adenoma of the Meibomian glands, of the same nature as Forster's—that is, an entirely benign tumor. Its development was due to hyperplasia of the glandular tissue. It was sharply defined from the surrounding tissue.

Another case was described by Bock[7]:

A man, sixty-two; on the inner surface of the right upper lid was a growth of a pale red color, with rough, uneven surface and pasty consistency; microscopically it showed an adenoma which had developed from the Meibomian glands.

Wadsworth[8] reports a case of adenoma of the Meibomian glands:

T. M., age eighteen, Massachusetts Charitable Eye and Ear Infirmary, October, 1894; a growth on the upper lid; history meagre. The growth had been removed four years previous. Since then it had returned very gradually. The tumor was situated on the middle of the lid, involving more than half its width, the whole height of the tarsus, and overhung the lower lid.

The conjunctiva on its posterior surface was somewhat thickened. The anterior surface above the lashes was nodular. The skin was fairly normal in appearance, but not movable. The part which corresponded to the lid edge was greatly increased in size, irregularly nodulated, and the nodules of a slightly yellow color, faintly umbilicated. Diagnosis is adeno-cystoma, originating in the Meibomian glands, showing in its outer portion a marked papillary structure; at its base a slight tendency to invade the tissues.

Rindfleisch[9] also describes a case under the same name, in which the histological composition was the same as in the cases just mentioned, and he believes the name, adenoma, applies to this growth, as it appeared as a circumscribed movable nodule under the skin, and could be dissected with ease from the surrounding tissue.

Moauro[10] describes a case which Salzmann believes was an adenoma of the tarsal glands of Krause. v. Graefe[11] also gives an indefinite description, in which the growth appeared above the border of the lid with manifestations of considerable irritation. The thickened lids became ulcerated, the edges were irregular, with sharp, steep elevations. The skin was undermined with perforations. The induration extended into the depth of the lid. A microscopic examination showed a neoplasm of epithelial tubes, with some reticular anastomosis; but was unable to ascertain from what tissue it developed.

This completes the list of the adenomata of the lid. The following are the only cases reported besides mine of carcinoma, or adeno-carcinoma, of the eyelids.

Fuchs[6] reports a case of glandular carcinoma of the lid. An oval tumor, over 1*cm* in length, which was immovably attached to the tarsus of the upper lid. It consisted partly of fibrous and partly of cartilaginous stroma, in which cancerous tubules were imbedded. In the stroma were groups of epithelial cells. In other parts, the fibres were widely separated, enclosing a homogeneous interstitial substance, which in parts contained cartilaginous cells, with distinct cartilaginous capsules. There was also a real hyalin cartilage. There were the three tissues—fibrous,

fibrous cartilaginous, and hyalin cartilaginous. In this matrix, so formed, were imbedded tubules with epithelial cells. These had in places a resemblance to tubular glands, in that the cellular arrangement was only single or double, and the lumen passed through the cellular tubule, but mostly there were either solid cancerous tubes, which extended in every direction through the tissue, or the original lumen was widened into a large, irregular cavity, in which the original substance penetrated in the form of nodular excrescences, covered with cancerous cells. The diagnosis was cysto-carcinoma. It was a mixed growth, with partly fibrous and partly chondromatous stroma. As the carcinoma developed in the tarsus, it could have originated only in the glands of Krause.

Another case, described by Snell,[12] an alveolar carcinoma on the eyelid. A tumor, the size of a small chestnut, located beneath the skin of the outer half of the lid; its consistency was hard, almost cartilaginous; external surface rough and irregular and, in one place, adherent to the skin. The conjunctival surface of the mass did not feel so nodular, but in one place the growth had involved the conjunctiva, an ulcerated surface with a diameter of one-tenth of an inch. There was also ulceration connected with the mass over a small extent of palpebral border of the lid, at about the juncture of its middle and outer third. Microscopically the growth seemed to be an alveolar carcinoma, or could be better termed a malignant adenoma. The fibrous tissues forming the alveolar walls were scanty in amount, spheroidal cell masses making up the bulk of the growth. The main portion of the tumor seems to be upon the external side of the tarsal cartilage. A microscopical specimen, which was made from the periphery of the mass, showed, however, that the growth had invaded the tarsal cartilage on its internal surface, and externally the muscle bundle of the orbicularis. As to the mode of origin of the growth, there is no accurate evidence. Probably it arose from some of the acini of the Meibomian glands.

Majeda,[13] Giessen, states that among the numerous microscopic specimens examined at his clinic, he found a

typical glandular carcinoma of the lid. There were peculiar spherical formations which seemed to be a mucoid degeneration of the cells.

Grosze[4] mentions a case of carcinoma of the tarsus.

Fuchs divides these tumors into two classes. (1) "The first class grow very rapidly and are at times encapsulated. They have no connection with the normal sweat glands. These are therefore heterotopic and resemble the carcinomata in their clinical (malignant) aspect." (2) "The second class are not so sharply defined or circumscribed, and the connection of the neoplastic glandular mass with the physiological sweat glands can readily be observed. Thierfelder classifies these growths as hypertrophy of the sweat glands." v. Graefe justly observes that "the clinical recognition of these hetero-plastic neoplasms of an epithelial character is exceedingly difficult." In many cases most favorable results are obtained by skilful and experienced surgeons and the patient has no relapse, whereas in other cases, having once attained marked development, they are as malignant as carcinoma or sarcoma." Hirschberg,[5] after an exhaustive examination of all the literature, claims that the progressive malignant neoplasms of the eyelid are so rare that scarce any mention is made of them, and there are no reports of cases. He states that he removed a carcinoma from the conjunctiva of the lid in May, 1869, and in 1870, when the case was seen again, there was no relapse.

There are several interesting features presented in the case I have reported: originally its benign character as adenoma, its gradual growth for over two years, and later when carcinomatous complication occurred there was at first no infection: then, when it had attained its height of development, its final degeneration into a typical carcinoma and consequent great malignancy and glandular involvement, with systemic infection.

As Salzmann remarks, adenoma of the lid seems to be characterized by benignity and slow growth, of which his case (2) is a marked example, requiring four years for its growth; also Case 3; Baldauf, Wadsworth, and Moauro's cases also developed in the same time.

The benign nature of adenoma and even to a certain extent of adeno-carcinoma has an important bearing in deciding as to the advisability of an operation. If we may compare these growths with others of the same nature in other portions of the body, as the breast, it would seem, according to Stewart,[10] that the growths become more malignant after operation than the original neoplasm. He states that its benignancy is usually attributed to a fatty degeneration of the epithelial elements and contraction of the stroma. Stewart, however, believes that the benignancy of the adeno-carcinomatous growth is dependent on the morphological changes and not on the degeneration. It is termed an atrophic scirrhus, but histologically it is of the adeno-carcinomatous type, and therefore comparatively benign.

However this may apply to the adenoma and even to the adeno-carcinoma, the true carcinoma should be extirpated immediately, as it is well known to be the most malignant of neoplasms. "It attacks heterologous tissues more readily than other growths do, and even hard tendinous or bony partitions" (Stellwag), as shown in this case, "and infection may spread quickly from the original focus to the adjacent parts or even to distant tissues, as the metastases usually take place earlier in cancer than other more histoid tumors. The means of transfer are the lymphatics, hence swelling of the lymphatic glands usually occur earlier."

Furthermore, he adds, that even the apparently benign tumors that have long remained unchanged and not injurious, often change their character constantly and become exceedingly infectious. But it is impossible to decide the time when this unfortunate change will occur, and if infection of the neighboring parts or dissemination of the germs has once set in, the operation is usually without benefit, as the new foci hardly betray themselves at first and hence are readily overlooked, or may even rise in places where they cannot be reached. Hence relapses readily occur which progress very rapidly and usually kill the patient in a short time. Stellwag also believes that if the carcinomatous growth has attained considerable size and the lymphatic

glands are very much involved, the operation will hasten the process and probably shorten life.

Virchow,[1] in referring to the distinction between malignant and benign tumors, states that "the power of combination of tumors is very extensive. Not only do the most varied forms unite among themselves, but tumors of all three varieties (histoid, orgoid, teratoid) unite together. The change of type is very important practically, as tumors originally benign may gradually become malignant, and can only be considered benign as long as they are homogeneous. As soon as it ceases to be so it must at least be regarded as suspicious, *especially in the region of the eye.* The very considerable richness in lymphatics and blood-vessels of these parts, as well as the circumstance that the orbit is surrounded by cavities very difficult or impossible of access, are to be especially regarded as rendering even the continuous progress of a tumor injurious and still more so its dissemination."

In the case under consideration, the removal of the small pieces from the inner surface of the lid for microscopical examination was each time followed by increased swelling and inflammation of the lid and new nodules quickly replaced the tissue removed. The glandular enlargement increased considerably in size and extent, so much so that the patient herself complained, and later, several months after the radical extirpation of the glands, there was a marked recurrence in that portion of the skin of the lid that was left. It became more indurated and nodular, with a dense infiltration around the original wound and along the place of incision for the removal of the glands. I learned that the patient died two or three months after the operation for the removal of the glandular enlargements.

LITERATURE.

1. Salzmann, Max. Archiv. of Ophthal., vol. xx., No. 3, p. 380.
2. Stellwag, Carion v. *Diseases of the Eye*, p. 558, etc.
3. Knapp, H. A Case of Adenoma of the Meibomian Glands. *Transact. of the American Ophthal. Society, Thirty-seventh Annual Meeting*, p. 328.
4. *Zehender's Klin. Monatsbl.*, 1890, p. 396.

5. FUCHS. Ueber das Chalazion und einige seltenere Lidgeschwulste. *v. Graefe's Archiv* vol. xxiv., No. 2, pp. 121 and 157.

6. BALDAUF. Ein Fall von Adenom der Meibomischen Drüsen. *Inaug. Dissert.*, Munich, 1870.

7. BOCK. Ein Fall von Adenom der Meibomischen Drüsen. *Wiener med. Wochenschr.*, 1888, vol. i., p. 799.

8. WADSWORTH. An Adenoma of the Meibomian Glands. *Transact. Amer. Ophthal. Soc.*, 1894-1896, Hartford, 1897, vii., p. 393.

9. RINDFLEISCH. *Pathologische Geweblehre*, 3d ed., p. 291.

10. MOAURO. Adenoma delle glandule tarso-congiuntivali di ciaccio. *Rivista interna di med. e chir.*, vol. iv., No. 4, p. 209.

11. *v. Graefe's Arch.*, vol. x., part 1, p. 206. Zur Casuistik der Tumoren.

12. SNELL, S. Alveolar Carcinoma of the Eyelid. *Transact. Ophth. Soc. United Kingdom*, London, 1895-1896, vol. xvi., p. 39-41.

13. MÁJEDA (Giessen). *Bericht*, 30. *Versammlung der Deutschen Ophthalm. Gesellschaft*, Aug. 4, 1902.

14. GROSZE. Carcinoma Tarsi. *Szemiszet*, Budapest, 1896.

15. HIRSCHBERG. *Archiv für Augen- und Ohrenheilkunde*, vol. ii., part 1, p. 229.

16. STEWART. *American Journal of Medical Science*, Sept., 1903.

17. VIRCHOW. *Die krankhaften Geschwülste*, vol. ii., p. 391.

GLAUCOMA SIMPLEX.

By Prof. C. HORSTMANN, Berlin.

Translated from Vol. XLII., October, 1900, German Edition.

By Dr. Matthias Lanckton Foster.

GLAUCOMA is due to an increase of the intraocular tension which causes a lowering of vision to total blindness. It is to be divided first into acute and chronic. Acute glaucoma is always inflammatory and causes blindness, more or less quickly. The chronic form is subdivided into chronic inflammatory glaucoma and glaucoma simplex. In the former the same disturbances are met with as in the acute form, but they are not so marked or severe. Chronic non-inflammatory glaucoma, or glaucoma simplex, is characterized by a cupping of the optic nerve at the place where it enters the eye, reduced vision, a defective visual field, and disturbances of the color sense and light sense. Externally the eyes appear normal, no inflammation is ever present, and the tension is not increased. It runs a very chronic course and usually terminates in total blindness.

In 1857, von Graefe gave an accurate description of this disease and denominated it amaurosis with excavation of the optic nerve. After the invention of the ophthalmoscope, it was called glaucoma by many, though all the outward signs of glaucoma were wanting, because the same form of lesion was present in the optic nerve as in inflammatory glaucoma. Von Graefe considered that these cases should be separated from glaucoma and studied under another name. He thought the cupping of the disc a lesion

of the nerve itself, that it should not be considered diagnostic of glaucoma, because in some cases its etiology was different, and said that iridectomy had never been known to cure a case of this nature, improve the vision, or enlarge the field.

In 1861, Hoffmanns, under the direction of Donders, published a work in which the name amaurosis with excavation of the optic nerve was cast aside and the affection called glaucoma simplex, because in his experience whenever the characteristic form of the excavation, reaching to the margin of the disc, was present, there was also increased intraocular tension. Sometimes ciliary neurosis was present, but it was never marked. Inflammatory symptoms were always absent. Rainbow colors and lights were seldom seen. The corneæ remained clear and lustrous, yet less sensitive, the pupils were fixed and dilated, the tissue of the iris scarcely changed. Donders assumed that there was always more or less increase of tension associated with the characteristic excavation, and this view has been generally adopted and is still published in most text-books.

In 1891, Schweigger sought to reintroduce the view held by von Graefe. He insisted it to be a well-known fact that cupping to the margin of the disc is frequently present when no increase of tension can be detected by the most experienced finger. A slight temporary increase of tension is not identical with glaucoma. In a severe case of iritis such an increase may be observed to appear and pass away and no trace of glaucoma be seen after a year of continuous observation. Schweigger ascribed the increased tension in such cases to a spasmodic contraction of the muscles caused by touching the eye. The resistance felt by the finger depends not only on the intraocular tension, but also on the hardness of the sclera, which varies in different individuals, and causes physiologically hard and physiologically soft eyes. Neither the tonometric nor the manometric measurement of the tension can be depended on, and comparison of that of the two eyes is the surest test. Deep cups which extend to the margin of the disc may exist without the least demonstrable increase of tension. Such

a condition might arise from any atrophic disease of the optic nerve when there was previously a physiological cup. If there is a distinct cup reaching to the margin of the disc in one eye but not in the other, glaucoma is certainly present, but if both nerves are cupped the diagnosis is more difficult, and a primary atrophy of the optic nerve, not caused by disease of the central nervous system, in connection with a pre-existing physiological cup, might easily be mistaken for glaucoma simplex.

One of the earliest and most frequent of the single symptoms of glaucoma is the appearance of mists and rainbow colors, due to a very slight cloudiness of the cornea, and is often associated with ill-marked hyperæmia of the conjunctiva and little increase of tension. Dilatation of the pupil is of more importance, and when it is present there are always cloudiness of the cornea and increase of tension. The same is true of shallowness of the anterior chamber, as this is caused only by an increase of the intraocular tension, which is always associated with inflammatory symptoms, even though they are very slight. The arterial pulse in glaucoma also depends on increased tension.

According to Donders, however, a mild ciliary neurosis, rainbow colors about lights, dilatation of the trunks of the subconjunctival vessels, immobility and dilatation of the pupil, with excavation of the head of the optic nerve to its margin, symptoms which are always to be met with in the so-called prodromal stage of inflammatory glaucoma, can be present in glaucoma simplex. All of these symptoms appear at the time of the attack, usually pass away again, and there is no doubt that they are forerunners of inflammation, even though it be very slight. For this reason, such cases should not only be eliminated from the class of glaucoma simplex, but should be included in that of chronic inflammatory glaucoma, a matter of grave therapeutic importance, because in that group iridectomy is always indicated. Under glaucoma simplex should be included only those cases in which there is cupping of the optic nerve, loss of vision, a defective field, and interference with color and light sense while the eye outwardly

appears to be perfectly normal, with no traces of inflammation and no increase of tension. In such cases iridectomy is not only useless, but may be followed by a more rapid loss of vision. The following cases confirm this view. They have all been met with during the past twenty years by the writer, and each has been observed by him for at least five years. They comprise nine cases of typical so-called glaucoma simplex, in four of which iridectomy was performed, and four cases of so-called glaucoma simplex without marked symptoms of inflammation, in each of which iridectomy was performed.

Case 1.—A man sixty-three years old came under observation in 1881. His health had always been good, he had never had any specific infection, and no general disease could be detected except an arteriosclerosis. He stated that his vision had been failing for about nine months. He had not observed any pain, rainbow colors, or dilatation of the pupil. The vision of each eye was $\frac{5}{30}$ with + 1.50 D. Color vision good. Tension normal. Concentric contraction of each field. A moderately deep excavation of the optic nerve to its margin and a glaucomatous halo could be seen in each eye with the ophthalmoscope. The optic nerve was pale, but the vessels were of about the normal calibre. The diagnosis of glaucoma simplex was made and iridectomy performed on each eye. No fault could be found with the operation or the course of recovery, but six weeks later the vision of the right eye had fallen to $\frac{5}{36}$, that of the left to $\frac{5}{24}$, and both fields had become much more contracted. After this the vision gradually failed until, a year before his death from apoplexy in 1887, he could only count fingers at a distance of two metres with his left eye and see movements of the hand at three metres with his right.

Case 2.—A woman, fifty-six years old, who had had chlorosis when young, but otherwise had enjoyed good health and had borne four living, healthy children, came in 1882 with the complaint that the sight of both eyes had been failing for the past two years, and that she could find no glasses which would enable her to see well. She had not noticed any pain in or about the eyes, rainbow colors, or mists, and the eyes had never been inflamed. The outward appearance of the eyes was normal; the pupils reacted promptly to light and accommodation; no in-

crease of tension. The eyes were emmetropic and presbyopic. R V $\frac{5}{15}$ with + 2.75; 0.75 could be read at 25*cm.* L V $\frac{5}{15}$ with + 2.75 ; 1.25 could be read at from 25 to 30*cm.* Central color vision good. Right field more defective than the left. A moderately deep excavation of each optic nerve to its margin, but no glaucomatous halo. The nerves were pale and the lamina cribrosa could be plainly seen. The calibre of the retinal vessels did not appear to be changed. Iridectomy on each eye. Although the operation and recovery were perfect, eight weeks later the vision of the right eye had fallen to $\frac{5}{30}$, that of the left to $\frac{5}{60}$, and the fields were more contracted. Vision deteriorated slowly until in 1888 she could only count fingers at two metres with the right eye and only see movements of the hand at two metres with the left. Some arteriosclerosis was present. The patient died of influenza in 1889.

Case 3.—A frail but healthy woman, sixty-four years old, with distinct signs of arteriosclerosis, came under observation in 1884. She stated that her vision, particularly of the left eye, had been failing for about two years. She had never noticed any mists or colors, and had never had any inflammation or pain in or about the eyes. Both eyes were outwardly of normal appearance, corneæ clear, anterior chambers of normal depth, pupils rather small, reacting promptly to light and accommodation. Tension of each eye normal. R V $\frac{5}{10}$ with + 2.50; L V $\frac{5}{15}$ to $\frac{5}{12}$ with + 4.50. Central color vision of each eye normal. Left field very small, in the right a sector-shaped defect. There was a deep excavation of each optic nerve reaching to its margin. Operation was declined. During the next year the first signs of aortic insufficiency and stenosis appeared, which caused death in 1889. During the last year of life the right vision had fallen to $\frac{5}{20}$, the left to $\frac{5}{60}$.

Case 4.—A healthy, strong woman fifty-eight years old came in 1885 with the complaint that the vision of her left eye had failed rather suddenly six weeks before. Careful investigation of her general condition, especially of her nervous system, revealed nothing abnormal except a little arteriosclerosis. Both eyes were outwardly normal, the corneæ were clear, the anterior chambers of normal depth, the pupils of medium size. Tension not increased. The left eye was myopic 4.50 D., vision $\frac{5}{5}$, with correction. The ophthalmoscope revealed a very deep excavation of the optic nerve reaching to its margin, with a glaucomatous

halo and a small conus. The field was normal and the color vision good. The right eye was myopic 4.50 D, vision with correction $\frac{6}{24}$. The field was cut off inward and downward. The ophthalmoscope revealed the same condition of the nerve as in the other eye, and in addition a small hemorrhage in the retina near the macula. The latter gradually diminished and disappeared after about four months. At that time the vision had improved to $\frac{6}{18}$, but there had been no change in the field. The patient left me, and an iridectomy was performed elsewhere six months later. She returned with her vision reduced to $\frac{6}{24}$. She had never seen any colors or mists. A year after the operation the right field had become considerably more contracted, while the left was only a little smaller on the inner side. The vision of her right eye slowly failed until she saw only movements of the hand at the distance of a metre a year before her death from apoplexy in 1896. The vision of her left eye had fallen only to $\frac{6}{18}$.

Case 5.—A woman sixty-six years old came in 1887 with the complaint that the sight of both eyes had been failing for about a year and a half and that she could find no glasses which would help her in near work. She had never noticed any signs of inflammation or pain in the eyes, nor seen any mists or colors. She was of medium size, weakly, but had always enjoyed good health, except that she had had anæmia when young. Nothing wrong could be found in her central nervous system. The temporal arteries on each side were very tortuous. The eyes were outwardly normal, the corneæ clear, the anterior chambers of normal depth, the pupils rather small, reacting promptly to light and accommodation. Tension normal. Both eyes emmetropic; vision of each $\frac{6}{18}$. Each field defective upward and inward. A deep excavation of each nerve reaching to the margin. During the next five years, the vision of each eye fell to $\frac{6}{60}$ and the fields became more contracted. The patient died in 1893 of influenza and pneumonia.

Case 6.—A woman, seventy-one years old, who had repeatedly sought medical help on account of a loss of vision which had lasted several years, consulted me in 1889. She appeared strong, had always been healthy, and, aside from arteriosclerotic changes and occasional attacks of palpitation of the heart, nothing abnormal was found by physical examination. She stated that she had never had inflammation of the eyes, suffered from pain

in or about them, or seen mists or colors. Outwardly the eyes were normal, the corneæ clear, the anterior chambers of normal depth, the pupils of medium size and prompt reaction to light and accommodation. Tension not increased. Vision of each eye $\frac{5}{20}$ with + 2 D. Field very defective inward and upward. Color vision good. A deep excavation of each nerve reaching to its margin with a small glaucomatous halo. Four years later she could still count fingers at two or three metres. After two years more she died of senile marasmus after having become completely blind.

Case 7.—A man, fifty-one years old, who had a history of syphilis treated with inunctions at the age of twenty-four, and had lost his right eye by accident at the age of twenty-six, came in 1891 with the complaint that the sight of his left eye had been failing for the past six months. The man was strong, had always been healthy, and showed only traces of arteriosclerosis. He had never had any pain in the eye or seen mists or colors. The right eye was phthisical and had no perception of light. The left eye was outwardly normal, cornea perfectly clear, anterior chamber of normal depth, pupil of medium size, reacting to light and accommodation. Tension normal. After correction of 2 D of myopia, vision was $\frac{5}{10}$. With + 1 he could read 0.6 at 30*cm*. There was a sector-shaped defect in the upper part of the field. Color vision good. A moderately deep excavation extended to the margins of the optic nerve. A colleague was then consulted who performed an iridectomy. Six months later, the vision had fallen to $\frac{5}{20}$ and the defect in the field had increased. Two years later, he could only count fingers at two metres. He finally became totally blind and died in 1896 of heart and kidney disease.

Case 8.—A woman, sixty-two years old, who had always enjoyed good health consulted me in 1894. Her vision had been steadily failing for nine months, but she had never noticed any pain in or about the eyes, mists, or colors. Outwardly the eyes appeared normal, the corneæ clear, the anterior chambers of normal depth, the pupils of medium size, reacting promptly, but somewhat slowly, the tension normal. Both fields were very small, but could not be measured because the vision of the right eye was reduced to fingers at $1\frac{1}{2}$ metres, that of the left to fingers at 2 metres. There was a deep excavation of the optic nerve reaching to its margins in each eye with a small glaucomatous

halo. At the present time, she sees movements of the hand at from 2 to 3 metres. Traces of sclerotic changes have also made their appearance in the vessels.

Case 9.—A man seventy-two years old consulted me in 1895. He had formerly lived freely but had never been sick. With his left eye, which had always been weak, he could see only movements of the hand. The vision of the right had markedly failed for about a year and a half. He had never had any pain or inflammation of the eye and had not seen mists or rainbow colors. Well-marked arteriosclerosis. Both eyes were outwardly normal, the pupils reacted perfectly, and the tension was normal. R V $\frac{5}{15}$ with + 2.50. There was a sector-shaped defect in the field upward and outward. The color vision was good. There was a moderately deep excavation of the optic nerve to its margins without halo. The left eye had hyperopic astigmatism and a similar condition of the nerve. Two years later, the vision of the right eye had fallen to $\frac{5}{15}$ and the defect in the field had increased. The patient died of apoplexy in 1900.

These nine cases exemplify the typical glaucoma simplex of Donders with no signs of irritation or increase of tension, or, more correctly, von Graefe's amaurosis or amblyopia with excavation of the optic nerve.

The following four cases are examples of Donders's glaucoma simplex with very transient symptoms of inflammation, such as the seeing of mists and rainbow colors and slight dilatation of the pupil.

Case 10.—In 1883, a healthy woman, forty-two years old, came with the complaint that the vision of her right eye had been very bad for nine months. The eye had never been inflamed or painful and she had never seen mists or colors. The eye was outwardly normal, the cornea clear, the anterior chamber of normal depth, the pupil of medium size reacting promptly to light and accommodation. Tension not increased. Vision $\frac{5}{15}$ with + 3 D. There was a sector-shaped defect in the field upward and inward. There was a moderately deep cup of the optic nerve which extended to its margin, but no glaucomatous halo. The vision of the left eye was from $\frac{4}{6}$ to $\frac{6}{6}$ with — 2.50 D; its field was normal. The fundus was normal except that a large physiological cup involved about a third of the papilla. Three

weeks later, the patient reappeared with the statement that she had seen clouds with the right eye. The pupil was now slightly dilated (*1mm* greater in diameter than the left) and a smoky cloudiness of the cornea could be seen by means of Hartnack's loupe. The vision was $\frac{6}{24}$. No increase of tension could be detected. Iridectomy was performed the next day from which there was a perfect recovery. The vision remained $\frac{6}{24}$; the field was unchanged. Six years later the condition was the same and no more symptoms have appeared.

Case 11.—In 1885, a man, fifty-five years old, consulted me because of a loss of vision during the past year. Aside from marked arteriosclerosis, his general condition was good. The eyes were outwardly normal, the corneæ clear, the anterior chambers of normal depth, the pupils of medium size and prompt reaction. Tension normal. R V $\frac{6}{15}$ with + 2, L V $\frac{6}{10}$ with + 1.50. Excavation of the optic nerve to its margin with a small glaucomatous halo in each eye. A sector-shaped defect in the upper part of each field. Five weeks later the patient returned and said he believed he had seen rainbow colors and flames before his right eye. There was a very slight dilatation of the pupil, no anæsthesia of the cornea and no increase of tension. An iridectomy was correctly performed, but three days after the operation numerous retinal hemorrhages were to be seen. A good recovery was made, but the vision had fallen to $\frac{6}{60}$. Repeated temporary appearances of mists were treated with eserine and no real deterioration followed. Death in 1892 from heart disease.

Case 12.—A man, fifty-seven years old, had noticed for a year that the vision of his left eye was imperfect while that of the right remained good. General health good, no traces of arteriosclerosis. Both eyes were outwardly normal, corneæ clear, anterior chambers of normal depth, pupils of medium size and good reaction. No mists, rainbow colors, or pain had ever been noticed and the tension was not increased. The right fundus was normal. In the left was an excavation of the optic nerve to its margin without glaucomatous halo. R V $\frac{6}{6}$ with — 2.25, L V $\frac{6}{60}$ with — 1.50. The right field was normal, the left had a sector-shaped defect inward and upward. Two weeks later the vision of the left eye had fallen to $\frac{6}{36}$ and at the same time the patient complained of seeing mists, though the cornea was clear. The pupil was larger than the right. Iridectomy was performed.

Vision $\frac{5}{35}$, defect in field somewhat larger. No change occurred during the next six years and the patient then passed from under observation.

Case 13.—An otherwise healthy woman, sixty-five years old, came in 1893 with the complaint that the vision of both eyes had failed during the past two years. She had never noticed any inflammation, pain, mists, or colors. The eyes were outwardly normal, tension normal, pupils rather small, of prompt reaction. R V $\frac{5}{6}$ with + 2.50, L V $\frac{5}{5}$ with + 2.50. Outer part of each field defective. Excavation to the margin of each optic nerve without halo. Five weeks later the patient returned because she had seen mists with both eyes. There was a very slight cloudiness of each cornea and a little dilatation of the pupils. Iridectomy on each eye. For a year the vision of the right eye remained at $\frac{5}{5}$, that of the left at $\frac{5}{35}$, then mists began to appear at times and the vision slowly sank to counting fingers at from one to two metres. In 1898 she died of carcinoma uteri.

These four cases are without doubt included in Donders's definition of glaucoma simplex. In each there was an excavation of the optic nerve to its margin, lowering of the vision, and a defective field. No increase of tension could ever be detected, but the symptoms of seeing mists and colors, very indistinct cloudiness of the cornea, and dilatation of the pupil, even though extremely slight, must be referred to a slight degree of inflammation. Possibly these symptoms had occurred previously in these patients, but had escaped notice on account of their insignificance until their importance had been made known. The facts that in two of the cases the disease was unilateral, and that iridectomy was of temporary or permanent value, are also indicative of glaucoma. But why should they be classed as glaucoma simplex when slight symptoms of inflammation were observed in their very chronic course? It would be more correct to classify the last four cases with chronic inflammatory glaucoma. There were only three of the characteristic symptoms of glaucoma in the first nine cases, the cupping of the disc, the lowering of vision, and the defective field. All other symptoms are lacking, though the patients, who belonged almost without exception to the

educated class, were urged to watch carefully for such symptoms as the appearance of mists, colors, or lights, the least pain in or about the eye, or the slightest ciliary injection. Not one of these, for the most part intelligent, patients was able to detect any of these symptoms and in no case in which it was performed was iridectomy of any benefit.

Cupping of the disc is a characteristic symptom of glaucoma. Yet it is met with, even associated with the glaucomatous halo, in perfectly normal eyes. It was found in the following four cases, all of elderly people who had more or less marked arteriosclerosis.

I. A man, sixty-four years old, who had a large leucoma of the left cornea. The right optic nerve was deeply cupped. R V ⅔ with — 6. Field and color sense normal. No glaucomatous symptoms or change in vision in ten years.

II. Man, seventy-two years old. A deep excavation reached to the margin of each nerve and there was a broad glaucomatous halo. Perfect or nearly perfect vision with + 1.50. Fields normal. Under observation six years, still living and has not yet shown any other symptom of glaucoma.

III. Woman, sixty-two years old, hypermetropia 2.25 D, nearly perfect vision, normal field, normal color perception. Each nerve cupped to its margin and a small glaucomatous halo. Retinæ became detached six months before her death from apoplexy.

IV. Man, sixty-seven years old. Each nerve cupped to its margin. No halo. Perfect vision with + 1.50. Fields and color perception normal. No change in the eyes for four years at the end of which time he died of heart disease.

These four cases prove that excavation of the optic nerve to its margin may occur in the absence of glaucoma, just as it may be absent in a case of typical inflammatory glaucoma. It is a settled fact that it is produced by intraocular pressure, but alone it is insufficient to justify a diagnosis. Other symptoms must accompany it, such as an increase of tension, even though extremely slight, lessened depth of the anterior chamber, relative decrease of accommodation,

transient dilatation of the pupil, not always accompanied by seeing mists and colors, or a slight ciliary injection, none of which symptoms was detected in any of the nine cases in spite of repeated, careful examinations. Schweigger says that atrophy of the optic-nerve fibres may produce such an excavation when there is a pre-existent physiological cup. As there were no signs of involvement of the central nervous system there was not a typical optic atrophy in these cases, unless it might be a rare form of primary atrophy. Schnabel thinks such an excavation can be caused by a retrobulbar affection of the optic nerve, but the symptoms given by Samelsohn, Vossius, and Uhthoff as characteristic of retrobulbar neuritis were absent. In the nine cases of glaucoma simplex and in the four cases of similarly cupped nerves in normal eyes almost all the patients had more or less marked arteriosclerosis, and perhaps this disease plays a part in the etiology. (The author will deal with this more fully later in the paper entitled arteriosclerosis and eye diseases.) Perhaps diminished powers of resistance of the posterior part of the sclera, especially of the lamina cribrosa, and the extension of the arachnoid space of the optic nerve into the sclera, may predispose to excavation of the nerve to its margin with the formation of a halo, but of this there is as yet no anatomical evidence. The other two symptoms of glaucoma present in the nine cases, lowering of the vision and defective fields, are common to all diseases of the optic nerve and not diagnostic of any one. Von Graefe's view was therefore correct, that this condition of the optic nerve is not diagnostic of glaucoma in the absence of other symptoms.

Glaucoma simplex should be divided into two groups: one, to contain the cases of true glaucoma without marked inflammatory symptoms, which would be classed more properly with chronic inflammatory glaucoma; the other, to include those typical cases in which appear no signs of inflammation or increase of tension. But as these cases are not glaucomatous it would be better to cast aside the name glaucoma simplex and to readopt the old, classical

designation of von Graefe's, amaurosis or amblyopia with excavation of the optic nerve. In the first group, iridectomy is always indicated and usually successful; in the other, the operation never yields the desired result and possibly may cause a more rapid approach of blindness.

A PECULIAR CHANGE IN THE CHOROID AFTER OPHTHALMIA NODOSA.

By Dr. W. REIS, Bonn.

(*With Plate XIII. of Vol. XLVI., German Edition.*)

Translated from the *Arch. f. Augenheilk.*, xlvi., Dec., 1902, by Dr. Matthias Lanckton Foster.

THE local symptoms in ophthalmia nodosa, little nodules in the conjunctiva, cornea, and iris, are well known, but similar changes in the deeper membranes of the eye, caused by the entrance of caterpillar hairs, have not hitherto been observed. This may be because these tissues are not necessarily involved in the superficial local lesion, but it is more likely because such changes occur in a late stage of a very chronic disease, long after the patient has passed out from under medical observation. Sometimes they could not be recognized even though present when an ophthalmoscopic examination is rendered difficult or impossible by opacities of the cornea or vitreous, or by an exudate into the pupil. But a recent examination of an old case of ophthalmia nodosa shows that caterpillar hairs can penetrate into the deepest parts of the eye and there produce characteristic changes. The case also throws some light on the later course and final result of this often destructive disease.

In September, 1889, a caterpillar was thrown against the right eye of Gabriel Flink. Recurring attacks of inflammation followed until he entered the hospital at this place in the spring of 1892. Later Krüger published the clinical history of the case in the Archives of Ophthalmology. After several weeks of

treatment, the eye was quiet, vision $\frac{20}{200}$, and the patient was discharged. Ten years later, June, 1902, he was readmitted for treatment of a burn of the left cornea, which recovered perfectly in two weeks.

During these ten years, the right eye had remained free from inflammation, and was not even irritated at this time by an ophthalmoscopic examination of an hour's duration made for the purpose of sketching the fundus. In the episcleral tissue beneath the lower outer segment of the ocular conjunctiva, rather near the vertical meridian and 1*mm* from the limbus of the cornea, was a roundish, flat nodule, 1*mm* in diameter, which felt firm, and over which the conjunctiva was movable. Downward and outward from this were five smaller, similar nodules, and somewhat outward and upward, separated by a conjunctival scar which marked the place where others had been excised, were two others, all of a homogeneous, light yellow, gelatinous appearance, of firm, almost cartilaginous consistence, and easily to be recognized.

There was an extensive opacity of the cornea in the region of the palpebral fissure, which was most dense near the lower-inner and lower-outer parts of the limbus, least so in the lower part of the region of the pupil, while the portion of the cornea next to the lower limbus remained clear. Under a loupe this opacity was resolved into numerous groups of punctate spots, situated close together and just beneath the epithelium, and was seen to contain, particularly near the margin of the cornea, peculiar round particles with sharp margins which appeared dark with focal illumination. This entire opacity may with certainty be considered a degenerative change and classed as zonular keratitis. In the upper-outer quadrant of the cornea, as described by Krüger, was a thick, cicatricial, tongue-shaped opacity in the parenchyma of the cornea, which extended several *mm* from the limbus and contained in its midst a yellow deposit. With the loupe a hair can be seen to lie horizontally in the opacity, its ends enclosed on all sides by the yellow tissue, through which it could be seen dimly, but sufficiently well to enable it to be recognized, the middle portion placed more superficially in the cicatrix without being enclosed in this manner. Above and below the yellow envelope was a row of very thin, whitish nodules.

The surface of the iris, as compared with that of the left eye

seemed defaced and irregular, though its color did not markedly differ. The peculiar dark furrow, mentioned by Krüger, was quite distinct. It began in the upper-outer quadrant, corresponding to the tongue-shaped opacity of the cornea, and passed just external to the lesser circle of the iris, forming a slight curve with its convexity upward, to the insertion of the iris on the nasal side. It was very shallow, dark in color, and was the result of a circumscribed atrophy of the anterior layers of the iris so as to lay bare the pigment layer. With the loupe very fine little vessels could be seen radiating over the iris from the pupil toward this furrow. These were mostly disused and appeared as fine, grayish-white threads. The furrow near its nasal end became slightly broader and darker, almost black, and then again grew smaller as it continued toward the angle of the anterior chamber, where it ended exactly in the horizontal meridian. The last small section could not be satisfactorily examined because of the corneal opacity. A similar atrophic spot in the iris, with a little grayish-white thickening—organized exudate,—could be seen on its anterior surface, at the angle of the anterior chamber, close to the lower end of the vertical meridian. This spot was in the form of a right-angled triangle, each side *2mm* long. Episcleral nodules lay close beneath and a trace outward from this place.

The pupil was small, round, and reacted to light, but could be dilated only partially by atropine because of broad synechiæ at its upper and outer margin. On the lower outer part of the anterior capsule was a circumscribed white exudate as large as a small lentil.

The view obtained of the fundus was surprisingly good. No lesions of any kind were present except the one about to be described and portrayed as seen by the indirect method in Plate XIII.

A peculiar atrophic band in the choroid, sharply defined and bordered in places by a slight amount of pigment, began about one and a half papillary diameters from the lower-outer margin of the optic disc, and extended downward in a slight curve convex upward and outward. Its average breadth was rather more than $\frac{1}{3}$ the diameter of the disc. About the end nearest the papilla was an area of yellowish-white or yellowish-red color which gradually merged into that of the normal fundus. At the point where this band assumed a vertical direction it was joined at an angle of 45° by a similar, smaller, and shorter band coming from

above and outward. This was sharply defined and each side had a pigmented margin which at a certain point spread out so as nearly to meet. A Y is formed by the junction of these bands, the first mentioned of which continued its course still farther downward. There were differences between the two diverging arms of the Y not only in length, breadth, and form, but also in color. The first mentioned arm had the yellowish-red or yellowish-white appearance of atrophic choroidal tissue, covered in places by thin deposits of pigment, while the smaller had a peculiar, homogeneous appearance in its middle and upper part, and gave forth a delicate green reflex, such as is presented by newly formed connective tissue in the retina. But that it lay beneath the retina was proved by the fact that several retinal vessels passed over it. From the point where the two arms joined, the first mentioned one became smaller and its edges of pigment broadened, first on the outer, then on the inner side, until they united to form an unbroken band of pigment, which extended almost vertically downward for from four to five papillary diameters, to a mass of pigment from which a broader, ill-defined band stretched downward and inward and then downward until its farther course could be no longer followed.

The course of the retinal vessels showed that this lesion was in the choroid and beneath the retina. A branch of the superior nasal artery crossed the middle of the outer, shorter arm of the Y; the superior nasal vein crossed both arms and received a little branch from both; the nasal artery itself ran downward for a long distance upon the pigmented band.

There still remains to be mentioned a little isolated, rectangular, yellowish deposit in the angle formed by the junction of the two arms of the Y, the longitudinal axis of which was nearly parallel to the artery a little below it.

The vision of the eye had improved from $\frac{20}{200}$ to $\frac{20}{40}$, a remarkable result when we take into consideration the prolonged, severe inflammation which it had formerly undergone, and the frequently disastrous results in other cases. The fields for white and for colors were of normal extent, but there was a scotoma in the lower temporal quadrant with a relative scotoma for blue, which corresponded only roughly with the ophthalmoscopic situation of the choroidal lesion, and had ill-defined boundaries. The patient could not clearly distinguish the line of demarcation between the normal field of vision and the relative scotoma, within which dark

blue appeared as lighter blue, bluish white, and white, because the transition was so gradual. There was an absolute scotoma for blue at a point which corresponded pretty exactly with the situation of the part of the atrophic choroidal band lying nearest the disc. The fact that a color scotoma for blue alone was found accords with the claim lately made by Schlösser (1), that the most delicate test for pathological changes in the choroid is by perimetry with blue, and indicates a lesion in that membrane.

The position, form, extent, and appearance of the lesion, together with the fact that it was the only change in an otherwise healthy fundus, exclude the idea that it was a spontaneous pathological deposit. Its appearance was at first suggestive of a rupture of the choroid, but its position in the upper-inner quadrant, its great length, its almost straight course, the difference in the pigmentation of the upper end and of the rest, and its Y-shaped division are sufficient to render such a theory doubtful, the more so as the patient denied that he had ever received a severe blow on the eyeball. It would need a very severe contusion to produce so extensive a rupture, so it could not have been caused by the blow with the caterpillar. Moreover, if it had been caused by the latter, the lesion would have become visible soon afterward, but no mention of such an appearance is made in the clinical history in 1892, though the hyperæmic condition of the papilla is noted. The theory that it was caused by a fragment of caterpillar hair which had worked its way back into the choroid is favored by the position of the lesion in the upper-inner quadrant at a point toward which the furrow in the upper part of the iris was directed, together with the fact that a caterpillar hair which formerly was visible in this groove had disappeared. It is also favored by the long, narrow, sharply defined form of the lesion, which gave the observer the impression that it had been caused by a foreign body pushing its way along in the choroid, as well as by the pigmentation of the proximal and distal portions. The distal section, which would be the portion first passed through by the supposed foreign body, appeared as a band of pigment, while the end nearest

the papilla showed atrophy of the choroid and only traces of pigmentation.

The absence of any signs of such inflammation as is caused in the conjunctiva by the entrance of caterpillar hairs is an argument against this theory, but as this inflammation is probably caused by a chemical poison peculiar to the hairs, it is conceivable that such a hair might have lost its noxious property before it could work its way to the back part of the eye and be able to inflict only mechanical injury on the tissues through which it slowly passed. This would explain the narrowness of the lesion as well as the absence of inflammation and clinical symptoms. The most probable explanation of the Y-shaped form is that the hair divided into two parts which had begun to pursue different directions.

Another point of interest is the remarkably good functional result in spite of the prolongation and severity of the disease. The degenerative corneal opacity shows that the chemical poison must have interfered to some degree with the nutrition of the tissues. Yet, notwithstanding this and the penetration of the hair into the choroid, the vision improved to $\frac{20}{50}$. This favors the theory that the chemical element, whether an organic acid or a ferment, was the chief factor in producing the injury inflicted, and that it became exhausted in the anterior part of the eye.

The description given by Krüger of the subconjunctival nodules and of the tongue-shaped corneal opacity with the embedded hair was accurate ten years later. Such a stationary condition of conjunctival nodules does not seem to be the rule. In Hanke's (2) and Natanson's (3) cases they disappeared in the course of a few weeks after the traumatism, in Krüger's (4) after some months, in Becker's (5), and Reis's (6) after a year. The probable explanation of this persistence was that the hairs were still within them, and to get complete evidence in regard to this a subconjunctival nodule was excised, hardened, embedded in celloidin, and cut into a series of over one hundred sections which were stained in various ways.

Within normal conjunctival tissue was a polynuclear, roundish mass in an envelope of closely packed connective-

tissue cells. It was composed of connective tissue with an interstitial substance of thick, long, homogeneous-looking trabeculæ, between which lay scattered long nuclei rich in chromatin. Farther in, the interstitial substance was looser and less well stained, while the nuclei increased in number. The latter were partly long and narrow, partly knobbed or club-shaped, sometimes fusiform, convoluted, or stellate, all very darkly stained, often with fine, long processes, without a recognizable body of protoplasm. Thus these nuclei had all the characteristics of neoplastic connective-tissue cells, and were often arranged in a radiating manner as if indicating a point of irritation in their midst. There were no leucocytes or giant cells. The difference between the construction of these nodules when old and when in the fresh inflammatory stage is consonant with the general law of pathology, that granulation tissue caused by the presence of an unabsorbable foreign body is finally transformed into sclerotic, cicatricial tissue.

Within the nodule could be seen the slightly oblique section of a well-preserved hair, with colorless medulla and brownish-yellow periphery. Its contour showed the same slight indentation that I formerly (6) described. Its finer structure had been preserved, yet the influence of the living tissue, with which it had been so long in contact, upon its hard coat was shown by the presence of shallow, irregular notches, which differed from the normal indentation. This may have a part in the explanation of the supposed breaking of the hair in the choroid mentioned above. But the change is so insignificant in spite of the twelve years and a half spent in the nodule that, instead of supporting Hillemann's (7) idea that a caterpillar's hair would be absorbed, it favors Hanke's opinion that such an absorption was impossible. This is not surprising, as Schwartz (8) and others have shown that eyelashes driven into the anterior chamber may remain there for years with little change.

Finally this may be considered a demonstration of the ability of these hairs to migrate into deeper parts and cause inflammation, which has been denied by Pagenstecher (9) and others. If a hair can advance in the choroid to the neigh-

borhood of the papilla by the mechanism recently described by Bayer (10), there is no reason to ascribe nodules in the iris to capillary embolism of the conjunctival or anterior ciliary arteries.

LITERATURE.

1. SCHLOSSER, *Sammlung zwangloser Abhandlungen aus dem Gebiete der Augenheilkunde*, Bd. iii., Heft 8.
2. HANKE, *Beiträge zur Augenheilkunde*, Bd. iii.
3. NATANSON, *Klin. Monatsbl. f. Augenh.*, 1897.
4. KRÜGER, *Arch. f. Augenh.*, Bd. xxiv.
5. BECKER, *Berl. klin. Wochenschr.*, 1892, No. 22.
6. REIS, *Klin. Monatsbl. f. Augenh.*, 1900.
7. HILLEMANNS, *Deutsche med. Wochenschr.*, 1894, No. 24.
8. SCHWARTZ, *Beiträge zur Augenheilk.*, Bd. iii.
9. PAGENSTECHER, Versammlung der ophthal. Gesellsch. in Heidelberg, 1893, *Klin. Monatsbl. f. Augenheilk.*, xxi., Beilageheft.
10. BAYER, *Münchener med. Wochenschr.*, 1900, 21.

REPORT OF TWO CASES OF FAMILY MACULAR DEGENERATION OF THE CORNEA.[1]

By Dr. CLARENCE A. VEASEY, Philadelphia.

IN the January number of the *Centralblatt f. prakt. Augenheilk.*, 1904, Fehr reports, from the eye clinic of Hirschberg, three cases of a corneal affection which he has termed family macular degeneration. The disease is characterized by a progressive opacity of the cornea of both eyes, beginning about the tenth or twelfth year of age, and finally leading to disability for work after about thirty years. The opacity is diffuse and intermingled with numerous whitish dots and maculæ; but upon close examination with a strong corneal loupe, the diffuse opacity is found to consist of numerous fine chagrin dots. In the central portion of the cornea the opacity is densest, and the superficial layers are those principally involved; in the periphery, however, the deeper layers are most affected. There is no vascularization, nor tendency to involve the deeper structures of the eye, and indeed beyond the progressive failure of vision and very slight irritability and photophobia there are no subjective symptoms. The surface of the cornea is even and smooth, reflecting light normally, and sensation is unaffected. There seems to be a tendency to affect several members of the same family, but the etiology is undetermined, and treatment has proved ineffective.

Fehr has regarded the affection as an intermediate form of corneal disease between the nodular and lattice-like

[1] Read at the fortieth annual meeting of the American Ophthalmological Society, July, 1904.

opacities, described by Haab, Dimmer, Freund, Groenouw, and Fuchs. He has reported three cases (two sisters and a brother), and in reviewing the literature found only one case (Koerber's) probably identical with his. To these four cases I desire to add the two following, a brother and a sister, one of whom was exhibited before the Section on Ophthalmology of the College of Physicians of Philadelphia in Feb., 1899.

CASE I.—W. R., a married male, aged forty-one years, was first seen February 6, 1899, in the service of Dr. G. E. de Schweinitz, at the Jefferson Medical College Hospital. The patient recalls nothing concerning the ocular conditions of his grandparents, but his father's eyes were good, though he died from supposed cancer in his sixty-third year. Personal examination of the eyes of the mother, her age now being seventy-one, show them to be normal, excepting the usual refractive condition.

The patient's general health is excellent. During childhood he had measles and scarlet-fever, but no abnormal conditions followed the attacks. Somewhere about the tenth year of age he began to have trouble in seeing the blackboard in school, and thought he was nearsighted. The condition continued to grow gradually worse, until an oculist was finally consulted, but no glass could be found that would materially improve the vision. The same result obtained with several other oculists who examined his eyes upon different occasions, and at the time of our first examination he could read nothing but very large print (J 12), and vision equalled in each eye 15/cc. Examination of each cornea showed it to be diffusely hazy, with numerous grayish-white spots and maculæ here and there, the opacity being more marked near the centre. With a corneal loupe and indirect illumination the diffuse haze resolved itself into hundreds of minute dots, almost like fine stippling, in the midst of which were found maculæ of various shapes and sizes; and though the diffuse haziness was observed over the whole cornea, it was most marked near the centre. The maculæ were also more marked near the centre, and indeed there was a ring, about *4mm* in width, just within the corneal limbus, in which but few maculæ were found. In the periphery of the cornea the opacity was not only less dense but occupied the deeper layers, whereas in the centre the superficial layers were those most involved. The

surface of the cornea was perfectly smooth, and sensation was normal. There was a moderate regular corneal astigmatism in each eye. The pupil reaction and the lens were also normal. Vision had progressively failed, and at the time of the examination the patient could do no fine work. Excepting the progressive failure of vision, slight irritability, producing more or less lachrymation, and some photophobia in very bright light, there were no subjective symptoms.

The patient has been seen occasionally, and was last examined a few days ago. The condition is becoming more marked, and vision at the present time equals 3½/100 in the right eye and 3/100 in the left eye. No treatment has checked the progress of the affection, and no lens has improved the vision since the patient has been under our observation, a period of more than five years. The patient is the father of two healthy children, a boy, aged eleven years, and a girl, aged nine years, both of whom have normal eyes at the present time.

Case 2.—B. R., an unmarried female, aged forty-three years, is a sister of the patient just described. She has always been healthy, excepting an attack of erysipelas in early childhood and some catarrhal deafness. About the twelfth year of age she first observed that she could not see so well, and also thought she was myopic. At the time of the first examination, in February, 1899, the vision of each eye equalled 1/40; at the present time it is 1/50 of normal. She can only see very large type (J 14), no glass improves, and she is incapacitated for all but the coarsest kind of work. The corneal conditions are exactly similar to the brother's, except that they are somewhat more advanced, so that it would be superfluous to describe them in detail. There are also four other brothers and sisters, the eyes of whom are perfectly normal.

In a thorough investigation of the cases no cause could be found to which to attribute the condition, and all treatment has been powerless to check its progress.

A CASE OF PSEUDOLEUCÆMIC LYMPHOMATA OF THE EYELIDS, FOLLOWED BY A GENERALIZED FORMATION OF LYMPHOMATA.

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THE tumors of the lymphatic glands have formed a favorite field of study for many authors since Virchow established a systematic classification of them. Between sarcoma on the one hand and leucæmia on the other are many transitional forms, which can be distinguished only arbitrarily. Recently the condition of the blood has been considered the main reliance for diagnostic purposes, by which a case might be judged objectively from the exact counting of the lymphocytes, without regard to this or that clinical symptom. Schmidt-Rimpler mentions a series of cases of leucæmia and pseudoleucæmia with tumors in the lids and orbits, but these observations are in part old and insufficient. Hochheim has separated a group which he calls "simple lymphomata" from the leucæmic and pseudoleucæmic lymphomata, without giving a satisfactory reason. There is no fundamental difference between his cases and those of pseudoleucæmia. What is called simple lymphoma by Paltauf and Borst is a purely local tumor of infectious origin, formed in a single lymphatic gland, or in lymphadenoid tissue. But Axenfeld believes that when infection can be excluded as a cause, a general disease is present, even if the lymphatic glands are not yet involved. The fact that in Hochheim's cases of simple lymphoma tumors of the lids

or orbits alone were present is explained by the observation of Axenfeld, that in many cases of pseudoleucæmia such tumors are for a long time the first and only symptom. When the cases are seen in this early stage, and not afterward, it cannot be stated that glandular swellings did not appear later. Again, it might be that the glands involved were too small to be felt by the patient or the examiner, and finally involvement of the internal lymphatic glands, or of the spleen, or of the bone marrow, before the external glands is not excluded. The non-recurrence after removal proves nothing, as pseudoleucæmia has been observed to come to a spontaneous standstill. Hence Hochheim's and all similar cases should be classed with that disease.

An incompletely observed case of this kind, with symmetrical lymphomata of all four lids, is on record in the clinic in Leipsic.

H. G., eighteen years old. Chronic dacryocystitis for six years, not improved by slitting the canaliculi and probing. The inner third of each lower lid was bluish gray, smooth, shining, and slightly prominent. Palpation revealed firm, deeply-placed tumors, about as large as peas, which could be seen on eversion of the lids, more plainly on the left side. The Meibomian glands in this region could not be seen. There were like changes of less degree in the corresponding parts of the upper lids, more marked on the left side. The tumors were excised from both lower and the left upper lids. Each was about the size of a pea, and was found under the microscope to be composed of lymphatic tissue, sharply distinguished from its surroundings.

A more important contribution to the study of these tumors is made by a case under observation until the autopsy, a part of the history of which has already been published by Boerma. I will recapitulate briefly the principal points in his paper.

The patient stated that the disease had begun two years before with swellings in both upper lids. Six months later the glands in the neck and groin became swollen.

The tumors were firm, elastic, and wholly occupied both lids of the right eye and the lower lid of the left, while in

the left upper lid two nodules as large as beans could be felt. The tarsal conjunctiva of each upper lid was smooth, not movable, over the tumor. In the four retrotarsal folds the conjunctiva was peculiarly gelatinous, grayish yellow, and slightly lumpy. The appearance of the right lower retrotarsal fold particularly reminded Boerma of amyloid degeneration. No exophthalmos. The skin was normal, not adherent to the tumors. The anterior and posterior cervical and the epitrochlear glands were enlarged. In each groin were about six tumors as large as small apples. The tumors were shelled out of all the lids through the conjunctiva by blunt dissection.

Three and a half months later there was a firm, elastic tumor, as large as an almond, in the right upper lid, and three nodules, scarcely as large as peas, in the outer part of the left upper lid. No tumors in the lower lids. No exophthalmos. Examination of the blood showed it to be normal. Glandular swellings as before, no new ones. General health good. The tumor of the right upper lid alone was shelled out through the skin, leaving the conjunctiva uninjured, except for a slight incision.

Boerma's next and last notes were made about six weeks later, in October, 1893. No tumors in the lids of the right eye. Lids of left eye as before. No change in the general condition.

This patient reappeared March 5, 1895. She had suffered the whole time from lachrymation, there had been a true loss of vision for some weeks, and the tumor in the left upper lid had grown larger.

A retinoscopic examination could not be made. There was irregular corneal astigmatism of the right eye.

R V, $\frac{6}{10}$ +; $\frac{6}{12}$ + with − 2.50.

L V, $\frac{6}{18}$; not improved by glasses.

Right eye. Good closure of lids. When the eye was open the palpebral fissure was triangular, on account of an angular curvature between the middle and inner thirds. Slight ectropion of lower lid. Greatest width of palpebral fissure *6mm.* The inner portion of the cornea was covered to the margin of the pupil by the swollen plica semilunaris. About the middle of

the upper lid was a slight flattened depression. The outer and inner thirds were slightly prominent, and deep-seated resistance could be felt with difficulty. On eversion of the lid, a yellowish tumor, nearly as large as a pea, and two smaller ones, like millet seeds, could be seen beneath the tarsal conjunctiva, at a point corresponding to the external thickening. No swelling could be seen in the middle of the lower lid, but in the fornix of the conjunctiva a resistance as large as a lentil could be felt. No growth could be seen in the inner third of the lower lid, because the hypertrophied plica hindered observation. When the eye was open the plica protruded forward conically, and there were a fold and a dragging on the place of implantation. Below the inner canthus a lump could be felt which did not appertain to the plica. On the plica, where it passed beneath the upper lid, were two nodules, nearly as large as hemp seed. The upper retrotarsal fold could not be inspected. The upper lid squeezed over the plica, and through it could be felt the latter as a resisting tumor. Somewhat above the outer canthus was another tumor, as large as a cherry, and the conjunctiva at this place arched forward.

Left eye: Lids closed well, but could be opened only for the space of *1mm.* A growth of the form and size of half a plum, cut longitudinally, occupied the upper lid from a point *6mm* from its free margin to the orbital margin. The conjunctiva of the lower lid was not thickened. The retrotarsal fold seemed to be drawn down and in toward the eyeball and plica, and to be somewhat shortened. A nodular tumor, as large as a small cherry, could be felt at the outer canthus, where it was covered partly by the upper, partly by the lower, lid. There was nothing notable about the tarsal conjunctiva of the upper lid. The upper retrotarsal fold was not present as such, but was replaced by a sausage-shaped mass. There was a slight depression at the point where the principal tumors came together. The tissue about the upper punctum was puffy. In the plica there was a nodule, as large as a millet seed, and in the furrow of constriction in the upper fornix were two as large as peas between the two large tumors.

The tumors of the left upper lid and about the canthus were removed under ether by blunt dissection, without injury to the conjunctiva. On the right side the tumor of the plica alone was removed. The divided peripheral edge of this membrane was closed with two sutures, while a small defect was left in its lower

fold. A gland removed from beneath the chin was found to be adherent to the skin, but elsewhere easily separable.

Seventeen days later there was a tumor, almost as large as a cherry, in the left upper lid, which, on removal, was found to be so adherent to the skin and subjacent tissues that it could not be completely shelled out.

There was no reaction. After three days the sutures were removed and the patient could open her eyes much better. At this time there was a growth, as large as a cherry, in the outer third of the right upper lid, and another, as large as a cherry-pit, in the inner third. No tumor could be felt in the right lower lid. There was an indefinite hardness, but no circumscribed tumor, in the upper-outer part of the left upper lid. In the middle of the right cheek were two glandular swellings as large as plums; toward the right ear, another of the same size; at each angle of the jaw and under the chin were others as large as cherries. In front of the sterno-cleido-mastoid and behind the ear were several enlarged glands. In the supraclavicular fossa were several glands as large as cherry-pits, in the infraclavicular fossa others as large as beans, in the axillæ almost as large as plums. The epitrochlear glands formed lumps as large as cherries. In each groin was a nodular lump, the one on the right side as large as a fist, the one on the left as large as a goose egg. There were also smaller lumps or each side, near Poupart's ligament. In each popliteal space was a tumor as large as a goose egg. In the pelvis, growths as large as plums could be felt on each side. Blood normal. Prescribed arsenic; and discharged from hospital.

Re-entrance November 28, 1895. Examination by Professor Romberg.

Small, weakly, emaciated woman. Skin yellow, pale, and very dry. Slight œdema at the ankles.

At each external canthus there were tumors as large as half-beans, not adherent to the skin, not movable above the subjacent tissue. Scattered over the body were many infiltrated lymphatic glands. On each side of the face, near the margin of the jaw, were two, varying in size from that of a pea to that of a plum. A chain of glands, averaging *1cm* in diameter, ran from the left mastoid process to the chin. There was a row of three along the margin of the left trapezius, two on the anterior edge of the right trapezius, one on the left side of the vertebra prominens, one

beneath the right mastoid process, two beneath the right ramus of the lower jaw, four in the left and one in the right supraclavicular fossa, and one just below the left clavicle at the anterior margin of the deltoid, all of about the size of peas or beans. There were also two, as large as cherries, in the left and one in the right axilla, one as large as a plum on the upper margin of the median sulcus of the right arm, one as large as a pea in the left epitrochlear region, and one as large as a bean a hand's breadth above the right internal condyle. Below Poupart's ligament, on each side, was a mass of glands, that on the right larger than a fist, that on the left smaller and composed of eight glands, more easily distinguishable than on the right side. In the right popliteal space was a tumor as large as a plum, in the left two as large as cherries. In the pelvis, masses as large as fists could be felt, which seemed to lie on the ileo-psoas muscles.

All of these glandular tumors were freely movable, with the single exception of the gland beneath the left angle of the jaw, which was adherent to the skin, but not to the subjacent tissue. At this place the skin was slightly reddened. The large masses in the groins were freely movable as regarded the skin and subjacent tissues, but the component glands seemed to have coalesced. There were some distended veins, but no other change in the skin over them.

The hard palate from the teeth to the soft palate was swollen, red, soft, and divided by a furrow into two parts. The tonsils were hypertrophic and very red. Examination of the thorax negative as to the presence of a tumor. The liver extended down almost to the navel and to the left border of the sternum. Its surface was smooth, its lower margin sharp, its consistency apparently normal. The spleen could not be felt, but was located by percussion between the upper margin of the tenth and the lower margin of the twelfth ribs. No tumors could be felt elsewhere, except the one in the pelvis already mentioned.

The patient's appetite was fair, her urine and bowels normal.

Examination of the blood, November 30, 1895. Form and color of blood corpuscles normal. Number of the red, 3,936,000; of the white, 12,000. Hæmoglobin, 84 %. Three days later, number of red corpuscles, 4,088,000; of white, 10,000. Hæmoglobin, 89 %.

Dec. 22d.—At the right inner canthus, a tumor as large as a pea could be felt in the lower lid, and one nearly as large as a

cherry in the upper. In the middle of the right upper lid was one as large as a cherry-pit, adherent to the subjacent tissue, and in the outer third, one similar to that at the inner canthus. No growth could be found in the right lower lid. In the tarsal conjunctiva of the left upper lid, which could be only partially everted, was a fairly firm swelling, as large as a lentil. Discharged from hospital, and directed to take arsenic.

Re-entrance March 8, 1897. The right upper lid was rigid, from the presence of three tumors, one as large as a hazel-nut, the others larger, with nodular surfaces. The entire left-upper lid was occupied by an oval tumor. In the left lower lid were two smaller tumors, of the same consistency as those on the right side. On each side the retrotarsal folds were swollen, adherent to the tumors, and had a glassy appearance. No exophthalmos. Twelve days later, the tumors were removed from the right upper lid. Pleurisy and broncho-pneumonia supervened, and caused death on the ninth day.

Autopsy.—In addition to the glandular tumors beneath the skin, varying in size from that of a pea to that of a closed fist, numerous nodules were found in the soft palate, the base of the tongue, the œsophagus, and the trachea. The tonsils were transformed into large tumors. The lymphatic glands about the bronchi were in part swollen to the size of walnuts, while roundish, firm nodules were scattered over the cut surface of the lungs and on the diaphragm. The spleen weighed 650 *grams*, was firm, grayish red, and fairly filled with blood. Its trabeculæ were poorly developed, its follicles everywhere easily recognizable as yellowish nodules of the size of hemp-seeds. The liver weighed 2000 *grams*, was firm, and grayish red. Its structure was not quite clear, its tissue evenly filled with blood. The kidneys were not enlarged, pale, and grayish red. The capsules were finely granular and not easily removed. In the parenchyma were many circumscribed, yellowish, firm nodules as large as peas, some of them close to the periphery. The gastric follicles were changed into little grayish-yellow nodules. The intestinal follicles and Peyer's patches appeared as circumscribed deposits on the surface of the otherwise pale and delicate mucosa. The mesenteric and retroperitoneal

glands were coalesced into tumors of the size of a child's head. Diagnosis: pseudoleucæmia.

REMARKS.

The observation of this patient extended over five years. If the time is added from the beginning of the growth in the lid until she was first seen by Boerma, the duration of the disease was approximately seven years. This long duration is remarkable. Excluding the acute pseudoleucæmia of Ebstein, Gowers, Falkenthal, Schulz, and Westphal give the average as from one to two years in cases in which arsenic is not used or does not work well. Winiwarter reported a case in which life was prolonged over four years by the use of arsenic. Whether this cause operated here or not is doubtful, because the clinical history does not mention any direct effect of arsenic. Possibly the long duration indicates that this case had a different etiology. According to Troje, the initial symptoms appear in the mucous membranes in cases which run a short course. It was not so in this case. On the contrary, the general condition was given as good by Boerma to the end of his observations. The initial symptoms were symmetrical growths in the four eyelids, similar to those in the incompletely observed cases of Schirmer, Gayet (Case 2), and de Wecker, and in our case. Exophthalmos was never present. Boerma found on his first examination the lymphatic glands of the neck, throat, elbows, and groin swollen, but not interfering with the general health. Six months later, October, 1893, the glands were in the same condition. In 1895 the lid tumors had returned and predominated in the upper lids, while many new glandular swellings were added to those formerly present. Nothing is said in the clinical history about the general health at this time, so it may be assumed to have been good. The tumors were removed from both upper lids and the patient was given arsenic from this time. At the end of the same year new symptoms had appeared. Examinations of the blood showed at first 84 % of hæmoglobin, afterward 89 %, accompanied by a slight decrease of the red blood corpuscles and a slight increase of the white,

a condition which was formerly considered characteristic of pseudoleucæmia. But we lack data as to the specific, pathognomonic form of the leucocytosis. The modern formula of hæmatology postulates a normal, or very slightly increased, number of all the leucocytes, with a relative increase of the lymphocytes. In pronounced cases anæmia is never wanting, but here it was not marked. According to Pinkus, pseudoleucæmia is to be distinguished from leucæmia by the relative number of the leucocytes, w : r :: 1 : 100 or 1:200. Pseudoleucæmia is indicated by the lesser quotient in this case. But this is of little value. The main reliance is upon the lymphocytes, which normally form a third of the entire number of leucocytes, and 4000 out of 12,000 leucocytes (30 %) does not indicate a pathological condition.

At this time the spleen could not be felt. As the disease had lasted for three years this is extraordinary, for, except in the purely lymphatic forms, enlargement of the spleen is a prominent symptom in advanced cases of pseudoleucæmia. At the same time the liver was enlarged, a symptom seldom seen except when there is a splenic tumor. It was a symptom that the disease had entered upon its progressive stage. Other signs of this were the agglomeration of swollen glands in the groins, the formation of lymphomata in the hard palate and tonsils, and the commencing cachexia. The diagnosis of pseudoleucæmia was hardly doubtful, even in the absence of a swollen spleen, which Borst declares to be a secondary symptom which may appear earlier or later. The patient was still taking arsenic internally. The tumors had recurred in the lids and the conjunctiva was involved.

Finally, in the spring of 1897, the tumor was again removed from the upper lid, and the patient died a week later of broncho-pneumonia. Whether death was in any way due to the pseudoleucæmia or was caused by an intercurrent disease it is difficult to say, but in pseudoleucæmia death frequently results from involvement of the respiratory organs.

The autopsy showed that the disease had invaded almost every organ. There were lymphatic tumors in the skin,

which have been observed only in those cases described as "pseudoleucæmia cutis." It is also rarely that lymphatic tumors have been observed in the popliteal and epitrochlear regions. Internally the lymphatic glands were everywhere swollen, the mesenteric and retroperitoneal blended into large masses, which showed the progressive character of the disease.

The tumor of the spleen, which had formed during the last year, was not of the kind usually met with in this disease. There were no large nodules in the parenchyma; the infiltration involved the follicles only. Gowers says this is rare except in the acute, febrile form.

In the kidneys there were many nodules as large as peas, but no larger ones. Virchow and Göppert particularly mention the mixed form, diffiuse enlargement of the kidney with nodules within. Ollivier and Ranvier consider the purely diffiuse form to be the prevailing type.

The condition of the liver also differed from that generally found in pseudoleucæmia—simply diffuse enlargement with no nodules.

The most notable changes were in the gastro-intestinal canal, throughout the whole length of which the follicles had become little nodules. Ebstein pronounces this to be very rare. In acute febrile cases multiple patches are foúnd in the stomach and intestines, and these may ulcerate, but the corresponding symptoms, hæmatemesis or diarrhœa, usually appear at the beginning of the disease. In this case the infiltration began in the œsophagus. Very few cases of large, flat tumors of the gastric mucous membrane, or of multiple nodules throughout the intestines, have been reported. Little nodules in the lungs and pleuræ have been observed more often, though larger growths are more characteristic of pseudoleucæmia.

To briefly recapitulate, we had to deal with a general disease the long duration of which was in accordance with the universal distribution of the metastases. Infiltration of one lymphatic gland after another was added to the rare initial symptom of symmetrical formation of tumors in the four eyelids. The progressive stage was marked by anæmia

and cachexia, enlargement of the liver, and coalescence of separate glandular tumors, while the spleen remained remarkably in the background. Then the autopsy revealed infiltration of the follicles of the mucous membrane of the throat, œsophagus, and gastro-intestinal canal, together with an unusual form of tumor of the spleen. A diagnosis to which no exception might be taken could not be made in this case because the number of the lymphocytes was not increased. This criterion forms the basis of Pinkus's system. He sets apart acute lymphatic leucæmia as a separate disease, one which is excluded in this case. He also groups together as chronic lymphatic leucæmia both true lymphatic leucæmia and lymphatic pseudoleucæmia. This case should be classed as one of pseudoleucæmia because of its long and uniform clinical course and its comparative benignity.

Treacher Collins reported the case of a girl one and three-quarter years old, who had symmetrical tumors of the lids and orbits with exophthalmos. The external lymphatic glands were not swollen, but the spleen and liver were enlarged. The blood was not analyzed. The general condition rapidly failed and death occurred in about five weeks. At autopsy the external lymphatic glands were found to be uninvolved, but those in the mediastinum and abdomen were united into masses. The liver and left kidney were enlarged. There were white nodes in the spleen, nodules in the uterus, infiltration of the follicles of the small intestine, and the lesser wings of the sphenoid were softened. This case gives the impression of a general disease which attacked the spleen primarily, the liver, kidneys, intestine, lymphatics at the base of the skull, and the orbital tissues secondarily,—the splenic form of leucæmia, which is frequent in children, but may follow a comparatively long and benign course. It accords with Senator's description, and he gives six months as the average duration. The metastases were the same as in ordinary pseudoleucæmia except that they spread to a certain degree centrifugally and did not involve the external lymphatic glands.

Oxley saw a six-year-old-boy with swellings of the glands

and a tumor of the spleen. The disease lasted about a year, and exophthalmos of the right eye appeared shortly before death. The blood was not examined. On autopsy, growths were found in the lungs, liver, spleen, and kidneys. Little tumors were scattered over the convexity and base of the brain beneath the pia and penetrated into the right orbit. The petrous portion of the right temporal bone and the roof of the right orbit were softened. This case resembles the preceding in the secondary character of the orbital infiltration. It is not certain that it was a case of the splenic form, because the date of the beginning of the glandular swellings is not given. There are also no notes in regard to the internal lymphatic glands.

Tomasi-Crudeli's case was one of a lad nineteen years old. The existing enlargement of the spleen was thought to be due to a previous intermittent fever. At first there was a universal glandular hyperplasia, and in the final stage periosteal tumors formed on the skull, face, vertebræ, ribs, sternum, and the ends of the long bones of the extremities in such a way that in some places the infiltration encroached upon the insertions of the muscles. The ocular symptoms also appeared at this time. Exophthalmos was not mentioned, but was probably present, because at the autopsy masses were found protruding from the base of the skull into the orbits. The mediastinal and retroperitoneal glands were swollen. The duration is not given. The blood was anæmic.

If the tumor of the spleen were excluded, this case would do as an example of the lymphatic form of leucæmia. The metastases in the periosteum of certain bones are very striking. The late appearance of the ocular symptoms and their dependence on the contents of the skull recall Oxley's case.

In Fröhlich's case the disease began in the lungs and caused cough and hæmoptysis. First the axillary glands became swollen, then the inguinal glands and both upper lids. In the final stage, the cervical glands were swollen and there were periosteal tumors on the glabella, tibia, fibula, and sternum, and cutaneous tumors on the arm. Repeated

examinations of the blood showed at first an increase of the white corpuscles, later simply anæmia. Duration about six months. The autopsy showed involvement of the internal lymphatic glands, enlargement of the liver, no tumor of the spleen, and hemorrhagic exudates everywhere.

Fröhlich thought this case one of pure lymphatic pseudoleucæmia, because there was no tumor of the spleen and the bone marrow was intact. The hemorrhagic diathesis is interesting; Westphal found it in one-third of his cases. Schulz claims that the spleen may become swollen at the very last, because he found at autopsy a tumor of the spleen in ten out of twelve cases which had been diagnosed as pure lymphatic pseudoleucæmia. This accords with Borst's opinion, that the secondary appearance of a tumor of the spleen is characteristic of pseudoleucæmia as distinguished from leucæmia. Hochheim claims that the symptoms in Fröhlich's case indicate leucæmia as much as they do pseudoleucæmia.

These cases can be classified only arbitrarily. It suffices to say that cases of lymphomata of the lids alone without simultaneous swellings of the glands should be considered pseudoleucæmic. They may be thus grouped:

1. Cases in which only the upper lids were involved.

2. Cases in which tumors were formed in all four lids.

3. In all the other cases the lymphatic glands were involved to some extent. This varies from that of Hochheim's case in which a single gland of the chin and infiltration of the palate were mentioned, to that of Axenfeld's in which there was almost universal glandular hyperplasia.

4. The cases with swelling of the salivary glands are of special interest. This was the only accompanying symptom of the lid tumors in Fuchs's case and was associated with involvement of other glands in Fleischer's, Zirm's, Reymond's, and Bronner's cases. Different views are held regarding the diagnostic importance of swelling of these glands.

A tumor of the spleen coincident with lymphomata of the lids and orbits is mentioned by Guaita, Reymond, and

Fleischer. In Guaita's case the glandular swellings and the tumor of the spleen preceded the ocular symptoms.

Finally a word as to the condition of the conjunctiva in cases of symmetrical lymphomata of the lids and orbits. Sometimes there is a history of a preceding chronic inflammation of the conjunctiva and of the lachrymal sac. Thus Hochheim thought the lid tumors in his case had perhaps been caused by a chronic dacryocystitis, and in Axenfeld's case the tumors began as little chalazion-like nodules in the conjunctiva of all four lids. In Becker-Arnold's case there was a severe conjunctivitis previous to the appearance of the changes in the lids. In almost all cases of pseudoleucæmia the conjunctiva becomes involved during the course of the disease. Axenfeld, Boerma, Guaita, and Hochheim agree as to its gelatinous appearance, the thickening of the retrotarsal folds, and the hypertrophied plicæ. Fuchs described little nodules in the palpebral conjunctiva, Fleischer in the ocular. But conjunctivitis is absent in cases of pseudoleucæmia in which the tumors of the lids and orbits are secondary. Goldzieher has described as a lymphoma of the conjunctiva a unilateral, large follicular growth which he had observed on the conjunctiva coincidently with glandular swellings in the throat, and here the conjunctivitis was confined exclusively to the place of the lymphoma. Hochheim classes these also as pseudoleucæmia.

It has now been shown that pseudoleucæmia may appear first on the lids or conjunctiva, and that the conjunctiva is apt to be extensively involved when primary lymphomata appear in the lids or orbits.

LITERATURE.

GENERAL PATHOLOGY.

AXENFELD, *vide* in Lubarsch–Ostertag, *Ergebnisse d. allgem. Path. u. path. Anat.*, 1896, iv., p. 60.

BOHN, *Arch. f. klin. Med.*, v., p. 429.

BORST, *Lehre von den Geschwülsten*, 1902, i., p. 474.

COHNHEIM, *Virchow's Arch.*, 33.

EBERTH, *Virchow's Arch.*, 49, p. 63.

EBSTEIN, *Arch. f. klin. Med.*, 1891, p. 343.

EHRLICH-LAZARUS-PINKUS, *vide* in Nothnagel's *Sammelwerk d. spec. Path. u. Therap.*, 1902, viii., 2.
EICHHORST, quoted by Hochheim.
FALKENTHAL, *Dissertation*, Halle, 1884.
FREUDWEILER, *Arch. f. klin. Med.*, 64, p. 491.
GÖPPERT, *Virchow's Arch.*, 144, supplement, p. 1.
GOPPELT, *Dissertation*, Würzburg, 1891.
GOWERS, *Reynolds's System of Medicine.*
HAS, *Dissertation*, Würzburg, 1899.
JOSEPH, *Deutsche med. Woch.*, 1889, 46, and 1891, 51.
KAPOSI, *vide* Phillippson, *Virchow's Arch.*, 167, p. 58.
MEYER, *Dissertation*, Göttingen, 1889.
OETTE, *Dissertation*, Munich, 1897.
OLLIVIER and RANVIER, *Arch. de physiologie.*
PALTAUF, *vide* in Lubarsch-Ostertag, *Ergebnisse d. allgem. Path. u. path. Anat.*, 1896, iii., p. 667.
PEL, *Berl. klin. Wochensch.*, 1887, 35.
ROMBERG, *Deutsche med. Woch.*, 1892, p. 419.
ROTH, *Virchow's Arch.*, 54, p. 254.
SENATOR, *Berl. klin. Woch.*, 1882, p. 533.
SCHMITZ, *Petersb. klin. Wochensch.*, 1894, p. 449.
SCHULZ, *Arch. d. Heilk.*, 1874, p. 193.
STRAUZ, *Dissertation*, Breslau, 1878.
TROJE, *Berl. klin. Woch.*, 1892, p. 285.
VIRCHOW, *Die krankhaften Geschwülste*, ii., p. 557.
WAGNER, *Arch. f. klin. Med.*, 38, p. 201.
WESTPHAL, *Dissertation*, Griefswald, 1888; *Arch. f. klin. Med.*, 1893, p. 83.
WINIWARTER, *Arch. f. klin. Chir.*, 18, p. 98.
WUNDERLICH, *Arch. f. phys. Heilk.*, 1858, p. 123; *Arch. d. Heilk.*, 1886, p. 581.

OPHTHALMOLOGICAL LITERATURE.

ALEXANDER, *Kl. Monatsbl. f. Augenh.*, 1874, p. 164.
AXENFELD, *Arch. f. Ophth.*, 1891, 4, p. 102.
BECKER-ARNOLD, *Arch. f. Ophth.*, 1872, 2, p. 56.
BERNHEIMER, *Versammlung d. Ophthalm. Gesellsch.*, Heidelberg, 1890.
BOERMA, *Arch. f. Ophth.*, 1894, 4, p. 219.
BRONNER, Internat. Congress at Edinburgh, 1894, p. 202.
FLEISCHER, *Kl. Monatsbl. f. Augenh.*, 1902, p. 398.
FRÖHLICH, *Wiener med. Wochensch.*, 1897.
FUCHS, quoted by Fröhlich.
GAYET, *Arch. d'opht.*, 1886, p. 15.
GOLDZIEHER, *Wiener med. Woch.*, 1893, p. 1366.
GUAITA, Ophth. Congress at Pisa, 1890.
HOCHHEIM, *Arch. f. Ophth.*, 1900, 2, p. 347.
KERSCHBAUMER, *Arch. f. Ophth.*, 1895, 3, p. 99.
LEBER, *Arch. f. Ophth.*, 1878, 1, p. 295.

OSTERWALD, *Arch. f. Ophth.*, 1881, 3, p. 203.
OXLEY, *Brit. Med. Jour.*, March 4, 1876.
REYMOND, *Annali di ottalmol.*, 1883, p. 337.
SCHIRMER, *Kl. Monatsbl. f. Augenh.*, 1867, p. 125.
SCHMIDT-RIMPLER, Nothnagel's *Sammelwerk*, 1900, p. 391.
SILCOCK, *Trans. of the Ophth. Soc.*, 1888, p. 53.
TOMASI-CRUDELI, quoted by Hochheim.
TREACHER COLLINS, *Ophth. Hosp. Reports*, 1893, p. 248.
DE WECKER and LANDOLT, *Text-book*, 1889.
WESTHOF, *Geneeskundige Curant*, 1893.
ZIRM, quoted by Fröhlich.

THE PRESENT STATUS OF CERVICAL SYMPATHECTOMY FOR GLAUCOMA SIMPLEX.

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IN 1897, Jonnesco first removed the superior cervical sympathetic ganglion for relief of glaucoma. As is well known, his original cases were eight in number and included inflammatory and non-inflammatory glaucoma, and the results were generally favorable for the few days or weeks during which the majority were under observation. One showed improvement even for nine months. Since then the operation has been many times performed in Germany, France, and America, on glaucomatous eyes in all varieties and in all stages. In 1900, Axenfeld collected all the cases in the literature at that time and summarized the results. Wilder has recently collected the American cases (*Annals of Ophthal.*), and it may be estimated that probably over one hundred and fifty cases may be found in the literature up to the present. Yet with this large number of cases still nothing particularly decisive has been proved. Careful and complete observation extending over a considerable time has been too often omitted, so that in a large number of cases the results remain quite unconvincing. Nevertheless certain facts have been proved in the opinion of all observers. It is generally admitted that almost all cases show a temporary improvement, especially the chronic inflammatory cases and the cases of glaucoma simplex. Jonnesco, Ball, Lagrange, and Neese have operated for acute glaucoma in cases where little or no vision remained, the results showing improvement for a time, at least as regards tension and pain, though not in vision. Albertotti operated in one case of acute glaucoma where there was a vision of $\frac{5}{12}$ at the time of operation, but got no improvement after sympathectomy. Generally in chronic inflamma-

tory glaucoma a decided improvement has been noted in all symptoms, especially as regards vision, but in nearly all these cases the time of observation has been too short to warrant definite conclusions. Altogether, however, it is in glaucoma simplex that the best results have been obtained, a fact of special importance, as here iridectomy is universally admitted to be of least value.

Summing up the results of the published cases in 1900, Axenfeld concluded that the operation was not a dangerous one; that a number of glaucomatous eyes were helped for many months by resection, but there was no certainty that every case would be improved, or, if improved, that it would remain permanently so. As to the forms of glaucoma in which the operation was to be advised, he concluded that in acute glaucoma sympathectomy was to be rejected unless iridectomy was refused, or had been harmful on the other eye or had failed to arrest the disease. In hemorrhagic glaucoma, it was a justifiable expedient, though of doubtful value. In chronic inflammatory glaucoma and in glaucoma simplex, he believed that a series of successful published cases showed that the operation was to be recommended as a sequence to iridectomy. In glaucoma simplex, however, it might be given the first place over iridectomy in those cases where there is a great loss of vision, and where iridectomy generally proves useless or is followed by a still more rapid failure.

Hoor, writing in 1902, agrees with Axenfeld, but would advise in inflammatory cases before sympathectomy a second iridectomy where there is any doubt of the thoroughness of the first, and also sclerotomies. He has also seen good results from sclerotomy in glaucoma simplex.

Among the French observers, Abadie is of practically the same opinion, *i. e.*, that sympathectomy should be tried in glaucoma simplex before iridectomy in those cases where failing vision and narrowing of the field are the only symptoms and where pain and halos about lights are absent. American writers (Ball, Weeks, Suker, Wilder, and others) have also reported favorably on sympathectomy and reached similar conclusions.

In view of the above, then, it may be said that in acute and chronic inflammatory glaucoma the removal of the superior cervical ganglion has failed to establish its claim as a rival to iridectomy, and that little of a more favorable nature is to be expected from it in the future. But this is, of course, a circumstance of less regret, since we have in iridectomy an operation of extraordinary efficacy in exactly these cases. In glaucoma simplex, on the other hand, the matter is far different. Here iridectomy is admitted to be of much less value, in some cases seeming even to diminish rapidly what vision remains. Here a substitute for iridectomy and our other therapeutic measures is of great interest, and it becomes of the utmost importance to decide definitely what sympathectomy can do. Six years have elapsed since the introduction of this operation and a considerable number of cases of glaucoma simplex have been operated on, but still the final word has not been spoken. As a contribution to the settlement of this question, the writer has collected from the literature all the cases reported up to the present time that were accessible to him, and presents the following summary:

The literature shows sixty cases of glaucoma simplex treated by sympathectomy, counting each eye as one case. A general table of these has been arranged, giving the operator, and showing, first, the cases that improved without relapse so far as observed, and the duration of this period of observation; secondly, the cases that improved, but later relapsed; and thirdly, the cases that were not improved at all.

In this table the term improved is understood to mean a diminution of tension and improvement in vision. In most cases it means that the tension was reduced to normal, generally within a few hours after the operation, or at least within a few days. This is very constant in nearly all cases. Rohmer particularly reports an immediate fall of tension in his cases. Besides an improvement in central vision there is an increase in the size of the visual field. Summarizing then the above tabular view, it appears that in a great majority of all cases there is a more or less striking improve-

ment following sympathectomy, and, so far as immediate results are concerned, altogether good ground for the enthusiasm of the advocates of the operation.

TOTAL NUMBER OF CASES OF GLAUCOMA SIMPLEX TREATED BY SYMPATHECTOMY, WITH RESULTS AND LENGTH OF OBSERVATION (COUNTING EACH EYE AS ONE CASE).

Author.	Improved.	Improved, but later Relapsed.	Not Improved at all.
Abadie.	1 case, 1 yr.	1 case, 1 yr., then worse.	2 cases.
	1 " 3 mos.	1 " 3 mos., then worse.	
Altland.	1 " 7 mos.		
Angelucci.	1 " 1 mo.		
	1 " 6 mos.		
Axenfeld.	2 cases, 11 mos.		
	2 " 10 mos.		
	1 case, 4½ mos.		
Ball.		1 case. Acute glaucoma in 6 mos.	
Coover.		1 case. Improved 4 mos., then relapsed.	
Demicheri.	1 case, 2 mos.		
	1 " 3 wks.		
Dor.	1 " 6 wks.		
Grunert.		1 case. Relapsed in 4 mos.	
		1 case. Acute glaucoma in 9 wks.	
Hoor.	2 cases, 3 mos.		
Jatropoulos.			1 case, gradually became worse.
Jonnesco.	1 case, 3 mos.		
	1 " 5 wks.		
Mohr.	1 " 10 mos.	1 case. Acute glaucoma in 2 mos. Iridectomy. Loss of eye.	
LaMotte.			1 case, died of sepsis.
Reese.	1 case, 1 yr.		
Renaud.	2 cases, 2 yrs.		
	1 case, 9 mos.		
Rohmer.	1 " 1 yr.		1 case, 2 wks.
	2 cases, 5 mos.		
	2 " 1 mo.		
	1 case, 1 wk.		
	2 cases, 3 wks.		
	1 case, sev. mos.		
Schimanowsky.	1 " 1 mo.		
Starr.	2 cases, 6 mos.		
Suker.	2 " 2 yrs.		1 case.
Webster.	1 case, 1 yr.		
Weeks.	1 " 3 mos.	1 case. Acute glaucoma in 3 mos.	
		1 case, came to iridectomy in 9 mos.	
Wilder.	1 case, 6 mos.	1 case, failed after 3 mos.	1 case, 6 wks.
	1 " 4 mos.	1 case, in 1 mo. Iridectomy and loss of eye.	
Woodruff.		1 case, failed after 6 mos.	
Zimmermann.	1 case, 8 days.		
Totals.....	41 cases.	12 cases.	7 cases.

N. B.—Some of the cases collected by Wilder (*Annals of Ophth.*, 1904) have been omitted where the diagnosis was uncertain or details were insufficient, the cases being personal communications and therefore inaccessible to the writer.

But when one rules out those cases that were reported without subsequent observation of some weeks or months at least, the verdict is not so favorable. Many cases soon suffer a relapse, and the vision becomes as before the operation or even worse; or a glaucoma simplex may rapidly de-

velop into acute glaucoma. This, for instance, happened in four of the sixty cases. Selecting then those cases that have been observed for at least three months and omitting as unconclusive the temporary cases, one gets a more instructive but less favorable view. Of the sixty cases, the number that was observed for three months or more is forty-one, and these have been summarized as follows:

	History.	Condition just before Operation.	Condition after Operation.	Later Result.
1. Abadie.	O U. Glaucoma simplex. Woman 53. Duration two yrs.	O D. T = plus. Vod = $\frac{3}{18}$. Field: slightly contracted. O S. T = plus. Vos = $\frac{10}{200}$. Field: contr. on temp. side.	Double sympathectomy. O D. T = n. Vod = $\frac{10}{60}$. O S. T = n. Vos = $\frac{10}{100}$.	1 yr. later: T = normal O U. Vod = $\frac{3}{18}$. Vos = $\frac{3}{18}$. Still later: failing vision O D. T = plus.
2. Abadie.	O U. Glaucoma simplex. Man. Double iridectomy without success.	O D. T = plus. Vod = little. O S. T = plus. Vos = very little.	Double sympathectomy. O D. Tension lowered. V improved. O S. Tension lowered. V improved.	After 3 mos. Vod: falling. Vos: improving. Later: continued failure in Vod, with rising tension.
3. Altland.	O D. Glaucoma simplex, with subacute attacks complicated with retinal hemorrhages. Duration 6 mos. Man 67. O S. Enucleated for glaucoma absol.	O D. T = n (miotic). Vod = $\frac{5}{12}$. Field contracted.	O D. Sympathectomy. Vod = $\frac{5}{12}$. T = n.	O D. 7 mos. later: T = n. No miotic. Only one attack of dimness of vision. Vod = $\frac{5}{12}$.
4. Angelucci.	O D. Glaucoma simplex. Miotics for 15 days before operation without relief.	O D. T = plus 1. Vod = $\frac{3}{18}$. Field contracted to 20° (nasal).	O D. Sympathectomy. T = lowered at first. Vod = $\frac{3}{18}$. Field = n.	O D after 6 mos. with miotics. Vod and field remained about the same. Later, omitting miotics: Vod = $\frac{3}{18}$. Persistent vertigo and hemeralopia.
5. Axenfeld.	Glaucoma simplex O U. Failing Vou for 4 yrs. For 3 yrs. tension of plus 1, and pallor and cupping of discs. Double iridectomy. Eserine.	O D. T = plus. Vod = $\frac{1}{12}$. Field contracted nasally to 10°. Deep cupping. O S. T = plus. Vos = F at 6 in. Field greatly contracted. Cupping.	Sympathectomy O D. T = minus. Vod = F at 2*m* (excentric) Sympathectomy O S. T = minus. Vos: no change. Field very little larger.	1 yr. later: T = n. Vod = $\frac{5}{12}$. Field larger than before operation. 11 mos. O S. T = n. Vos = F at 6*m* (excentric). Field slightly larger than before oper. No miotics since operation.
6. Axenfeld.	Glaucoma simplex O U with perinuclear cataract and discrete areas of old choroiditis. Man 46. Duration several months (?).	O D. T = plus 1. Vod = F at 1*m*. Field contracted esp. on nasal side. Deep cupping and atrophy. O S. T = plus 1. Vos = l. p. Field contracted to small central fragment. Deep cupping. Atrophy.	Sympathectomy O D. T = nearly n. Vod = slightly better. Sympathectomy O S. T = n. Vos = no change.	10 mos. later: T = n. Vod = F at 1*m*. Field a little larger than before operation. 7 mos later: T = n. Vos = movement of hand at 2*m*. Field slightly larger than before operation. No miotics since operation.
7. Axenfeld.	Glaucoma simplex O U. Woman 52. Failing V for 3 yrs. 1 yr. previous double iridectomy with temporary relief. Miotics.	O D. T = plus. Vod = movement of hand. Cupping and atrophy. O S. T = plus. Vos = $\frac{5}{12}$ (central). Field: portion of temporal and a minute part of central remain.	Sympathectomy O S. T = lowered. Vos = unchanged. Field slightly enlarged.	O S. 4 mos. later: T = n. Vos = $\frac{3}{5}$. Field remains slightly larger. No miotics since operation.

	History.	Condition just before Operation.	Condition after Operation.	Later Result.
8. Ball.	O D. Glaucoma absol. Woman 43. Duration 2 years. O S. Glaucoma simplex. 2 years.	O D. T = plus 3. Vod = 0. Cupping. O S. T = plus 3. Vos = light percep. Cupping.	O D. Sympathectomy. Vod = light percep. T = plus 2. O S. Sympathectomy. Vos = F at 7 ft. T = n	No later report. O S. 6 mos. later: acute glaucoma and loss of all vision. (From Wilder's article.)
9. Coover.	O D. Glaucoma simplex. Man 65. Vod failing 1 yr. and not improved by miotics. O S. Glaucoma simplex. T = plus 2. Vos = $\frac{5}{200}$. Field contracted.	O D. T = plus 3. Vod = light percep. Pup. dilated and fixed. Field contracted. Cupping. Arterial pulsation.	O D. Sympathectomy. T = plus 1. Vod = F at 5 ft. O S. Not operated.	O D. 3 mos. later: T = plus 3. Vod = light percep. O S. 3 mos. later: Vos $\frac{1}{200}$.
10. Grunert.	Glaucoma simplex. Man 65.	T = plus 1.5. Vision = $\frac{5}{10}$. Field much contracted.	Sympathectomy. T = plus 0.5. Vision and field slightly improved.	4 mos. later: Vision as before operation. Field more contracted. Finally eserine with improvement again in vision.
11. Grunert.	Glaucoma simplex in one eye. Man 48. Glaucoma absol. in other eye.	T = plus 0.5. V = $\frac{5}{15}$. Field much contracted.	Sympathectomy. Vision and field improved.	9 wks. later: acute glaucoma. Iridectomy with loss of vitreous. Enucleation (the unoperated eye had never had inflammatory symptoms).
12. Hoor.	Glaucoma simplex O U. Man 64. Vou failing several mos. T = plus. Halos. Sclerotomy O U, with relief lasting 20 mos.	O D. T = plus. Vod = movement of hand. Deep cupping and atrophy. O S. T = plus. Vos = $\frac{5}{60}$. Field contracted. Cupping. and atrophy.	O D. Sympathectomy. T = lowered. O S. Sympathectomy, T = lowered.	3 mos. later: Vod = as before operation. O S. 3 mos. later: Vos = $\frac{5}{60}$. But field more contracted.
13. Jonnesco.	O D. Glaucoma simplex 1 yr. and Basedow's disease (6 yrs.). Double iridectomy. O S. Glaucoma absol.	O D. T = plus. Vod. = F at 40 *cm*. Cupping. O S. T = plus. Vos = nil. Cupping and atrophy.	O D. Sympathectomy. T = lowered. Vod = F at 1*m*. O S. Sympathectomy. T = lowered. Vos = nil.	3 mos. later: Vod = letters 8*cm* high at 1.30*m*. Goitre diminished. O S. 3 mos. later: no change.
14. Mohr.	O D. Glaucoma absol. O S. Glaucoma simplex. Man 50. Vos failing 1 yr. T = plus. Field contracted. Some relief from miotics.	O S. T = n. Vos = $\frac{5}{15}$. Field contracted to 5°. Pup. small (miotics).	O S. Sympathectomy. For 2 mos. gradual improvement. T = n. Vos = $\frac{1}{15}$ – $\frac{5}{15}$. Field enlarged to 10° – 30°.	O S. Two and half mos. later: acute glaucoma. Loss of eye from intraocular hemorrhage after iridectomy.
15. Mohr.	O D. Phthisis bulbi (traumatic). O S. Glaucoma simplex. Man 58. Vos failing 1 yr. T = plus 1–2. Vos = $\frac{1}{15}$. Pup. moderately dilated and field contracted.	O S. Miotics produced lowering of tension and enlargement of field. Disc pale and cupped.	O S. Sympathectomy. T became normal or minus. Vision improved.	O S. After 3 mos.: T = n. Vos = $\frac{5}{9}$. Field larger than before operation. After 10 mos.: (*vide* Ziehe and Axenfeld.) T = n. Vos = $\frac{5}{15}$.
16. Reese. (Wilder.)	O S. Glaucoma absol. Woman 58. O D. Glaucoma simplex. Duration 6 yrs. Double iridectomy 5 yrs. before. Relief from eserine.	O D. T = plus. Vos = F at 10 ft. Fields contracted nasally. Cupping.	O D. Sympathectomy. T = minus. Vision unchanged.	O D. 1 yr. later: Vision and field as before. T = minus (without a miotic).
17. Renaud. (Wilder.)	O U. Glaucoma simplex. Duration 18 mos.	O D. T = plus 2. Vod = light percep. Cupping. O S. T = plus 2. Vos = large objects at 6 ft. Cupping.	O D. Sympathectomy. T = plus 1. Vod = $\frac{5}{200}$. O S. Sympathectomy. T = plus 1. Vos = $\frac{5}{200}$.	2 yrs. later: Improvement retained in both eyes, though tension still plus. Personal communication to Dr. Wilder.

	History.	Condition just before Operation.	Condition after Operation.	Later Result.
18. Renaud. (Wilder.)	O D. Normal. Vod = $\frac{18}{18}$. Woman 40. O S. Glaucoma simplex. 7 mos. duration.	O S. T = plus 3. Vos = F at 3 ft. Pupil dil. Cupping.	Double sympathectomy. O S. T = n. Pup. contracted. Vos = F at 14 ft.	O S. 9 mos. later: condition unchanged.
19. Rohmer.	Woman 52. O D. Glaucoma simplex. 2 yrs. previous pain and failing Vod. Some improvement from iridectomy, miotics, and sclerotomy. O S. Glaucoma absol. (10 yrs.)	O D. T very high. Vod = percep. light. Field contracted. No bulbar injection.	O D. Sympathectomy. Immed. fall of T. Vod improved.	1 yr. later: T remains normal. Vod = $\frac{1}{3}$. Field increased.
20. Rohmer.	O U. Glaucoma simplex. Man 45. 16 mos. failing Vou. Pain (!). Halos.	O D. T = plus 1. Vod = 0.2. Pup. = 2 *mm.* Field slightly contracted (nasal). O S. T = plus 2. Vos = 0.3. Pup. = 3 *mm.* Field contracted (nasal). Cupping and pallor disc O U.	O D. Sympathectomy. T = lowered. O S. Sympathectomy. T = lowered.	5 mos. later: O D. Field as before operation. Vod = 0.6. O S. Field as before operation. Vos = 0.5.
21. Rohmer.	O D. Old iridocyclitis. Woman 60. O S. Glaucoma simplex. Duration 1 yr. Shortly before oper. symptoms aggravated by atropine, but relieved by miotics.	O S. Sl. injection. T = plus. Pain. Vos = F at 1 *m.* Cupping. Field greatly contracted.	O S. Sympathectomy. T = lowered.	O S. Several mos. later: Vos = $\frac{1}{4}$-$\frac{1}{3}$.
22. Starr. (Wilder.)	O U. Glaucoma simplex. Woman 63. Duration 1 yr. Relieved by eserine. Slight improvement O D from sclerotomy.	O D. T = plus 2. Vod = F at 18 ft. Field contracted nasal side. Cupping. O S. T = n. Vos = F at 4 ft. Field contracted nasal side. Cupping.	O D. Sympathectomy. T = plus 1. Vod = $\frac{20}{40}$. O S. Sympathectomy. T = n. Vos = $\frac{20}{15}$.	6 mos. later: condition unchanged in each eye, except fields slightly smaller.
23. Suker. (Wilder.)	O D. Glaucoma absol. Man 70. O S. Glaucoma simplex. Duration 2 yrs. Iridectomy 1 yr. before.	O S. T = n. Vos = $\frac{20}{200}$. Field contracted nasal side. Cupping.	O S. Sympathectomy. No change in field, tension, or vision.	O S. 3 ys. later: no change.
24. Suker. (Wilder.)	O U. Glaucoma simplex. Man 65. Duration year and a half.	O D. T = plus 2. Vod = F at 8 ft. Field contracted. Cupping. O S. T = plus. Vos = F at 10 ft. Field contracted. Lens cataractous.	O D. Sympathectomy. Field enlarged slightly, and central vision improved slightly. O S. Sympathectomy. Field enlarged slightly, and central vision improved slightly.	Later: Field contracted to less than before operation. Last observation 2 yrs. after.
25. Webster. (Wilder.)	O D. Glaucoma simplex. Man 49. Duration a few months. O S. Glaucoma absol. 1 year.	O D. T = plus. Vod = $\frac{18}{18}$. Field contracted. Cupping.	O D. Sympathectomy. T = minus. Vod = $\frac{18}{36}$. Pup. contracted. Field larger.	O D. One year later: T = n. Vod = $\frac{18}{18}$. Miosis.
26. Weeks.	O D. Glaucoma absol. Man 63. O S. Glaucoma simplex. Eserine with relief. Duration several yrs.	O S. T = plus. Vod = $\frac{6}{6}$. Field contracted to 20°.	O S. Sympathectomy. T = n. Vos = $\frac{6}{6}$. Pup. = contracted.	O S. 3 mos. later: T = plus. Vos $\frac{18}{18}$. Field larger on temporal side.
27. Weeks.	O U. Glaucoma simplex. Woman 52. Vod = failing 2 yrs. Halo. Vos = $\frac{18}{18}$. Sometimes sees halo.	O D. T = plus 2. Vod = F at 1 ft. Pup. dil., but reacting. Cupping. Field contracted to 10°–20°.	O D. Sympathectomy. T = minus, then n. Vod = F at 22 ft.	O D. For 1 mo. Vod improved to $\frac{18}{18}$, but T rose. At end of 3 mos. there was an acute glaucoma. Iridectomy. No further report.

	History.	Condition just before Operation.	Condition after Operation.	Later Result.
28. Weeks.	O U. Glaucoma simplex. Man 30. Vod failing for 2 yrs., with plus T. Vos failing for 3 yrs., with plus T. Vos = $\frac{2}{10}$. After sympathectomy (O D) acute glaucoma appeared in O S. Eserine.	O D. T = plus 1.5. Vod = $\frac{2}{10}$. Pup. = n. Field slightly contracted (nasal). Cupping. O S. Acute symptoms relieved by eserine. But T = plus 1. Pain. Cornea steamy. Field contracted. Cupping.	O D. Sympathectomy. T = n. O S. Sympathectomy. T = plus 1. Vos slightly improved.	O D. 3 mos. later: T = plus. Vod = $\frac{2}{10}$. Eserine being used. Further report (Wilder): 9 mos. later, iridectomy finally done also on O D. Last report: T = n. Vod = $\frac{2}{10}$. O S. In 2 wks. T reached plus 2. Iridectomy with relief. After 2 mos. T = n. Vos = $\frac{8}{200}$.
29. Wilder	O D. Glaucoma simplex. Man 74. Vod failing for 3 mos. Little or no pain. Halos. T = plus. Eserine (1 wk.) brought T to n., Vod to $\frac{2}{10}$, and enlarged field. O S. Glaucoma absol.	O D. T = n. Vod = $\frac{2}{10}$. Field much contracted. No marked cupping but disc grayish, and indistinct.	O D. Sympathectomy. T = n. Vod = $\frac{2}{10}$. Field greatly enlarged.	O D after 6 mos. Vod = unchanged. Field: nearly normal. (Eserine ?.)
30. Wilder.	O U. Glaucoma simplex. Man 46. Periodic failure Vou for 9 mos. Halo (O S). Eserine.	O D. T = plus 1. Vod = $\frac{10}{200}$. Pup. = small. Field much contracted (nasal). Cupping. O S. T = plus 1. Vos = $\frac{10}{200}$. Pup. = small. Field contracted (nasal). Cupping.	O D not operated. O S. Sympathectomy. T = n. No improvement in vision. Field same.	O D. 3 mos. later: T = plus. Vod = $\frac{10}{200}$. Pilocarpine. O S. 3 mos. later: Vos = failing, and plus T. Iridectomy. Vos = $\frac{2}{200}$ (2 mos. after).
31. Wilder.	O D. Glaucoma absol. Man 57. O S. Glaucoma simplex for 3 mos. Failing Vos and halo.	O S. T = plus. Vos = $\frac{2}{10}$. Pup. reacting. Only small temporal field remaining. Cupping.	O S. T remained plus. Pup. contracted. Vos = $\frac{2}{10}$. Field more contracted.	O S. 1 mo. later: sclerotomy. Slight relief. Then iridectomy, followed immediately by intraocular hemorrhage and loss of all vision.
32. Wilder.	O D. Glaucoma absol. Woman 78. O S. Glaucoma simplex. Duration 1 yr. T = plus. Vos = $\frac{2}{10}$. Pup. sl. dilated. Field contracted esp. nasal. Miotics brought T to n. and pupil contracted.	O S. T = n. Vos = $\frac{2}{200}$. Field contracted esp. nasal. Shallow cupping and pallor of disc. Pupil = small.	O S. Sympathectomy. T = n. Vos = $\frac{10}{200}$. Field: slightly larger.	O S. 4 mos. later: T = n. Vos = $\frac{20}{200}$. Field = same.
33. Woodruff.	O D. Glaucoma absol. Man. O S. Glaucoma simplex. Vos failing 3 yrs. Sees halos.	O S. T = plus. Vos = $\frac{2}{10}$. Pup. = dil. Field: much contracted. Cupping.	O S. Sympathectomy. T = n. Pup. contracted. Vos = improved.	O S several mos. later. Vos = $\frac{2}{10}$. Field: larger. Sees no halo. Further report (in Wilder's article) shows that at end of 6 mos. there was a return of all symptoms, and failing vision. Iridectomy with relief lasting to date.

Taking the general results of these forty-one eyes treated by sympathectomy, it appears that twenty-nine or seventy per cent. were improved for three months or more with no record of any relapse. Few of the cases were observed longer than

one year. Jonnesco, it is true, reported at the International Congress in Paris in 1900 on his results since 1897, but it is impossible to tell with certainty from his reports to which of his earlier cases he refers. In the above series, those that showed the greatest improvement and held this improvement the longest are the two reported by Abadie (one year), four by Axenfeld (ten and twelve months), one by Rohmer (one year), one by Altland (seven months), one by Angelucci (six months), and one by Starr (six months). Another case reported by Rohmer (No. 21) showed an improvement in vision from perception of light to one half of normal and held this for several months.

The remaining 12 cases are reported as relapsing within various periods from nine weeks to one year, four of these becoming acute glaucoma.

Why some cases improved and others did not is not apparent from the clinical reports. In a series like the above, representing glaucoma simplex in many stages and varieties, it is difficult to make any analysis. Still with a view of drawing, if possible, some general conclusions, the cases may be considered from various points of view as a basis of comparison. For instance, in some cases the sympathectomy was bilateral, in others not; some were operated on while considerable vision remained, while in others there was little more than light perception. Some were of rapid progress, and some already of several years' duration before operation.

Considering first the bilateral *versus* the unilateral operation, we find twenty-two eyes treated by double sympathectomy (Cases Nos. 1, 2, 5, 6, 8, 12, 13, 17, 18, 20, 22, and 24), and of these eighteen improved without reported relapse, and four improved but later relapsed, one of them becoming acute glaucoma (in eight months). But in the nineteen unilateral operations, while eleven improved without note as to relapse, eight improved but soon relapsed, and three of these became acute glaucoma, all within a short time,—a comparison clearly in favor of the double operation. Nevertheless one of the best results of sympathectomy reported (Rohmer's No. 19) was a unilateral case, in which the other eye had reached the stage of glaucoma absolutum.

Concerning the early *versus* the late operation, it appears that seventeen eyes came to operation with a fair vision remaining—*i. e.*, $\frac{20}{100}$ or over; and these may therefore be considered to offer the fairest test for the merits of the operation, on the theory that sympathectomy should be judged by cases that are not too far advanced. These cases are Nos. 1, 3, 4, 7, 10, 11, 14, 15, 20, 25, 26, 28, 29, 31, and 33. Of these, eleven were improved, and six improved but soon relapsed; two in fact developing into acute glaucoma within two months (11 and 14), and one (No. 31) requiring in one month iridectomy, which resulted in destructive intraocular hemorrhage. The early cases then present no better proportion of permanent cures than the general average.

Finally, comparing the good and the bad cases generally, the writer has been unable to find any predominance of any one characteristic in either class. The cases that improved and held this improvement without relapse had as often the bilateral as the unilateral operation, and the number that had a fair vision, say of $\frac{20}{100}$ or over, were as frequent as those that showed but little vision remaining.

As to the use of miotics before and after operation in the above cases, full details are generally not given. In most, miotics were thoroughly tried before operation, yet after operation they have relieved a case that had relapsed, but whether the pupil had again dilated is not stated.

As to intraocular hemorrhage where iridectomy was done after sympathectomy, its reported occurrence twice among seven cases seems a high proportion.

Serious after-results from sympathectomy are not reported either from the single or double operation. Neuschüler and Obarrio found, after sympathectomy in rabbits and cats, in almost all cases hemorrhage in iris and ciliary body. Angelucci and Arloing noted trophic disturbances, but these were not confirmed by Hertel and Mohr, and altogether the animal experiments are strikingly contradictory. The serious results noticed in some animal experiments are at any rate not apparent in the clinical reports. The ptosis is not marked and tends to disappear. Jonnesco and Floresco report, in 1902, a variable amount of congestion remaining

after three years in bulbar and palpebral conjunctiva; while the suppression of sweat function, trouble in mastication and swallowing, and hyperæsthesia tend to disappear or do disappear after a variable length of time.

Rohmer had in many of his cases a neuralgic form of pain in neck and shoulder, lasting often several weeks after sympathectomy. Weeks reports that some of his cases suffered from a sensation of fulness in the head, intermittent and pulsating in character, which was accentuated by over-exertion and the recumbent position. There is also anæsthesia as a result of cutting the cervical nerves. In view of the silence on the part of so many of the surgeons as to late results of sympathectomy, it still remains to be seen whether we have heard the last word as to the harmlessness of the operation. De Schweinitz, in his recent article on the physiology of the sympathetic (*Journ. Amer. Med. Assoc.*, Jan., 1904) concludes that we are not certain that resection may not be followed by trophic disturbances.

The scepticism as to the permanent value of sympathectomy, which the clinical results certainly warrant, is further strengthened by the lack of any theoretical basis for the operation—a fact which is, of course, inevitable in the absence of any accepted pathogenesis in glaucoma. Jonnesco's sweeping views as to the mechanism of sympathectomy are far from being accepted. He cites the experiments of Wegner,[1] who found that cutting the sympathetic in rabbits caused a lowering of the intraocular tension, due, in his opinion, to a dilatation of the blood-vessels, with resulting decrease in blood pressure and diminished intraocular secretion. Jonnesco's theory assumes that all the sympathetic fibres that go to the eye, to the blood-vessels, the iris, and to the smooth muscle fibres in Tenon's capsule pass first through the upper cervical ganglion; that stimulation of these produces the following effects: dilatation of the pupil, contraction of the intraocular arterioles, active contraction of the peribulbar muscular apparatus, and probably an increased activity of the secreting elements of the aqueous humor, with the result, on the one hand, of increased secretion, and, on

[1] *Arch. f. Ophthal.*, Band xii., S. 1, 1865.

the other hand, of the obstruction of the passage outward of these secretions, and hence an increase in tension. The increased blood pressure favors extravasation, the secretory fibres are stimulated, the dilated pupil obstructs the filtration angle, and the pressure on the emissary veins as they pass through Tenon's capsule causes a slight increase in the intraocular venous congestion. The effect of sympathectomy is to inhibit the vaso-constrictors and diminish extravasation, to inhibit the secretion, and relieve the filtration angle.

Abadie, who first suggested sympathectomy for glaucoma, has an entirely different theory. He endeavors to prove[1] that glaucoma is essentially due to an excitation of the vaso-dilatators of the sympathetic, either temporary or permanent, being in fact rather a local manifestation of a diseased condition of the sympathetic than a distinct disease, and that the increased tension is due to the distension of the blood-vessels, and, perhaps, to an increased intraocular secretion in consequence. He cites various facts in support of the theory—for instance, the favorable effects of pilocarpine and eserine, vaso-constrictors, and the opposite effect of atropine, a vaso-dilatator. In acute and subacute glaucoma that are benefited by iridectomy, he assumes that only the vessels of the anterior part of the eye are affected, and that they receive their sympathetic fibres from the fibres that follow the trigeminus and not from the carotid plexus. Hence the efficacy of iridectomy and the failure of sympathectomy.

On the contrary, in glaucoma simplex it may be assumed that the posterior segment of the eye is the part affected, and therefore the operation should be on the side of the cervical sympathetic. He also cites certain arguments not entirely clear as to the mydriasis observed in cases cured by iridectomy, and the absence of mydriasis before and after sympathectomy in glaucoma simplex.

The obvious objection to Abadie's theory is that the assumed vaso-dilatation appears contrary to the physiological facts, stimulation of the sympathetic seeming in the

[1] *Arch. d'ophtal.*, xxi., p. 129, 1901.

main to cause a vaso-constriction. Abadie's reply is that the normal action is to be distinguished from the action in disease. He claims[1] that in the case of a normal sympathetic we get after sympathectomy in man the usual signs of paralysis—viz., enophthalmus and a definite and a permanent (!) contraction of the pupil, as observed by Jaboulay after sympathectomy on epileptics. On the contrary, when the dilating fibres of the sympathetic are in a state of stimulation, sympathectomy produces entirely different results; and he asserts that after sympathectomy in glaucoma there is no enophthalmus and the pupil remains dilated and reacts. But actually this is only true in the sense that though the signs of paralysis do appear they soon wear off in most cases. Axenfeld found[2] that, as a rule, the usual symptoms of paralysis appear within the first twenty-four hours, though they may be delayed, or some may be absent; that they generally reach their maximum within a few days and tend to disappear, rarely being of permanent duration. The pupil sometimes regained its normal action within a few weeks or months, a phenomenon also observed after sympathetic paralysis in general, which detracts from Abadie's theory.

Summarizing, then, the theoretical basis for sympathectomy in glaucoma, one finds oneself in the realm of hypothesis with various conflicting theories. From a therapeutic point of view, however, the large number of reported positive results present something fairly tangible. It is true a study of the clinical results fails to show any factor, *so far as the writer has been able to discover*, that determines how far the operation will be successful in any given case, or what determines the duration of a favorable result. Clinical reports fail to show any marked gain in the early *versus* the late operation. Possibly it may be shown that the bilateral operation gives the most favorable result.

Still it may be said that in glaucoma simplex the tension is reduced in almost all cases generally to normal, and that it may remain so for many months. The vision shows at least a temporary improvement in a majority of cases, often

[1] *Vide* Herbet, p. 222.

[2] Page 53.

an improvement of considerable duration, unless an advanced atrophy makes vision out of the question. Serious after-results, that may be said to contra-indicate the operation, have so far not been demonstrated. Altogether the writer believes that sympathectomy is a distinctly justifiable operation that ought to be more often tried as a final resort in glaucoma simplex when, notwithstanding miotics, iridectomy, and sclerotomy, the disease progresses steadily towards eventual blindness.

BIBLIOGRAPHY.

ABADIE: "Nature et traitement du glaucome," *Arch. d'opht.*, xix., p. 94, 1899; "L'iridectomie dans le glaucome," *Clin. opht.*, vi., No. 33, 1900; "Des indications de l'ablation du ganglion cervical supérieur dans le glaucome," *Arch. d'opht.*, xxi., p. 129, 1901.

ALTLAND: "Exstirpation des Ganglion cervicale supremum Nervi sympath. bei Glaukom," *Klin. Monatsbl. f. Augenheilk.*, xl., S. 140, 1902.

ALBERTOTTI: "Breve relazione riguardante dieci simpatectomie cervicali eseguite sopra ammalati affeti da glaucoma." Modena, 1900.

ANGELUCCI: "Gli effeti della simpatectomia e la sua applicazione nella cura del glaucoma," *Archivio di ottalm.*, viii., 5–6, p. 216, 1900.

BALL: "Bericht ueber die Verhandl. des IX internat. ophthal. Kongresses zu Utrecht," Beilageheft z. *Zeitsch. f. Augenheilk.*, ix., S. 79, 1899.

BELLENCONTRE: "Sympathectomie," *Ann. d'oculist.*, t. cxxvi., p. 74.

BICHAT: "La sympathectomie dans le traitement du glaucome," *Thèse de Nancy*, 1901.

BLACK: "Resection of the Superior and Middle Cervical Ganglia of the Sympathetic for Subacute Glaucoma," *Ophth. Record*, p. 511, 1901; "Extirpation of the Two Upper Cervical Ganglia in a Case of Glaucoma," *Ophth. Record*, p. 150, 1901.

BURGHARD: "Three Cases of Removal of Superior Cervical Ganglion," *British Med. Jour.*, p. 1175, 1900.

CAMPOS: "Considérations sur la théorie symp. du glaucome," *Arch. d'opht.*, vol. xviii., p. 445, 1898.

COOVER: "Removal of the Right Upper Cervical Sympathetic Ganglion for the Relief of Glaucoma," *Ophth. Record*, p. 152, 1901.

DEMICHERI: "Sympathectomie dans les cas de glaucome," *Annal. d'oculist.*, t. cxxi., p. 188, 1899.

DISLER: "Ein Fall von Exstirpation des Ganglion cervicale supremum bei Glaukom," *Wratsch*, xxii., S. 956, 1901.

DODD: "Resection of the Superior Cervical Ganglion of the Sympathetic for Glaucoma and its Results," *Lancet*, Oct. 13, 1900, and March 23, 1901.

DOR: "Glaucome inflammatoire et hémorrhagique guéri par sympathectomie," *Clin. opht.*, No. 1, p. 6, 1901; "Glaucome bilatéral iridectomisé à droite, sympathectomisé à gauche," *Annal. d'oculist.*, t. cxxv., p. 201, 1901.

GIBSON and CUTLER : "Removal of the Cervical Sympathetic for the Relief of Glaucoma," *Annals of Surgery*, Sept., 1902.

GRUNERT : "Beiträge zur Exstirpation des Ganglion cervicale supremum Nervi sympathici bei Glaukom," *Klin. Monatsbl. f. Augenheilk.*, Okt., 1900.

HERBET : "Le sympathique cervical," *Thèse de Paris*, 1900.

HOOR : "Ein Beitrag zur Dauererfolg der Sympathicus-Resection gegen Glaukom," *Szemeszeti Lapok.*, No. 3, 1902 ; "Zur Indicationsfrage der Sympathicus-Resection gegen Glaukom," *Arch. f. Augenheilk.*, xlv., S. 277, 1902 ; "Beitrag zum Werthe der Sympathicus-Resection gegen Glaukom," *Wien. klin. Wochenschr.*, xv., No. 36, S. 907, 1903.

JATROPOULOS : "Un cas de glaucome monoculaire avec résection du ganglion cervical supérieur du grand sympathique," *Clin. opht.*, No. 20, 1899.

JONNESCO : *Bulletin de l'acad. de méd.*, Oct., 1897, Paris ; "Die Resection des Halssympathicus in der Behandlung des Glaucoms," *Wiener klin. Wochenschr.*, No. 18, 1899 ; *Bulletin de l'acad. de méd.*, Paris, Aug., 1900.

JONNESCO et FLORESCO : "Sur les phénomènes consécutifs à la résection du sympathique cervical chez l'homme," *Bulletin de l'acad. de méd.*, Paris, 1902.

LAGRANGE : "De la résection du sympathique dans le glaucome," *Annal. d'oculist.*, t. cxxix., p. 439, 1903.

LAMOTTE : "The New Surgical Treatment of Glaucoma," *Ophth. Record*, vol. xi., p. 516, 1902.

MARPLE : "Resection of the Cervical Sympathetic Ganglia in Glaucoma. Its Present Status," *Medical Record*, May 10, 1902.

MOHR : "Exstirpation des Ganglion cervicale supremum bei Glaucoma simplex," *Zeitschr. f. Augenheilk.*, ii., Heft 5, 1899 ; "Beitrag zur Exstirpation des Ganglion cervicale supremum Nervi sympathici bei Glaukom," *Klin. Monatsbl. f. Augenheilk.*, S. 159, 1900.

MULLEN: "Resection of the Superior Sympathetic Cervical Ganglia for Non-Inflammatory Glaucoma," *American Medicine*, vol. i., p. 552, 1901.

NEESE : "Glaucom Operationen nach Jonnesco und von Graefe's Iridectomie," *Centralbl. f. prakt. Augenheilk.*, xxvi., S. 105, 1902.

OBARRIO : "Ueber Durchschneidung des Halssympathicus," *Ophth. Klinik*, iii., No. 14, 1899.

PANAS : "Rapport sur un mémoire de M. le Dr. Jonnesco intitulé : Résection du sympathique cervical dans le traitement du glaucome," *Arch. d'opht.*, xviii., p. 448, 1898.

PEUGNIEZ : "Résection du ganglion supérieur du grand sympathique pour glaucome hémorrhagique" (Congrès franç. de chirurgie), *Clin. opht.*, No. 22, p. 349, 1901.

ROHMER : "Quelques observations de sympathectomie dans le glaucome," *Annal. d'oculist.*, t. cxxvii., p. 328, 1902.

SCHIMANOWSKY: "Zur Frage der Excision des oberen Halsganglion des Nervi sympathici bei Glaukom," *Westnik Ophth.*, xvii., 231, 1900 ; "Beziehung des Gangl. sup. Nervi symp. zum Auge," *Westnik Ophth.*, 1902.

DE SCHWEINITZ : "The Physiology of the Sympathetic in Relation to the Eye" *Journal American Med. Assoc.*, Jan., 1904.

SUKER: "Excision of the Superior Cervical Sympathetic Ganglion," *Ophth. Record*, p. 510, 1899 ; "The Surgery of the Superior Cervical Sympathetic

Ganglion," *New York Medical Journal*, vol. lxxi., No. 8, 1900; *Journal American Medical Assoc.*, p. 1588, 1901.

WEEKS: "Cases of Simple Chronic Glaucoma Treated by Resection of the Superior Ganglion of the Cervical Sympathetic," *Trans. Amer. Ophth. Soc.*, 1902.

WHITEHEAD: "The Treatment of Glaucoma by Excision of the Superior Cervical Ganglion of the Sympathetic," *Lancet*, July 6, 1901.

WILDER: "The Influence of Resection of the Cervical Sympathetic Ganglion in Glaucoma," *Annals of Ophth.*, vol. xiii., p. 17, 1904.

WILLIAMS: "Resection of the Cervical Sympathetic," *Med. News*, April, 1901.

WOODRUFF: "Report of a Case of the Removal of the Superior Cervical Sympathetic for Glaucoma," *Chicago Medical Recorder*, July, 1901.

ZIEHE und AXENFELD: "Sympathicus-Resektion bei Glaukom," *Sammlung zwangloser Abhandlungen aus dem Gebiet der Augenheilkunde*, Vossius, Band iv., Halle, 1901.

ZIMMERMANN: "Ueber einen Fall von Resektion des Ganglion cervicale supremum sympathici," *Ophth. Klinik*, Nr. 14, Bd. iii., 1899.

REPORT OF THE MEETING OF THE OPHTHALMOLOGICAL SOCIETY OF THE UNITED KINGDOM.

By Mr. C. DEVEREUX MARSHALL.

THURSDAY, JUNE 9, 1904. JOHN TWEEDY, F.R.C.S., PRESIDENT, IN THE CHAIR.

A case of primary optic atrophy due to lead.

Mr. Simeon Snell (Sheffield) related this case occurring in a boy aged sixteen. The sight had commenced to fail for rather more than a year before the patient was first seen in Oct., 1903, but had rapidly become worse during the last three months. The vision was R $\frac{6}{60}$ and L $\frac{1}{60}$; both optic papillæ were white and atrophic, but did not suggest a preceding neuritis. The family and personal history were good.

For two or three years the boy had worked as a file cutter, which exposed him to the influence of lead; he had the ordinary symptoms of lead poisoning. The optic atrophy was in Mr. Snell's opinion due to this cause, and all other causes had been eliminated.

Mr. Snell mentioned a similar case he had seen and stated that among file cutters he had observed several instances in which the optic nerves were affected either directly by the lead or in association with kidney or brain disease.

A case of atrophy of both optic discs resulting from uterine (post-partum) hemorrhage.

Mr. Snell related this case. The patient was a lady, aged twenty-eight, who was seen last February a few days after recovery from puerperal mania. Both papillæ were atrophied, but there was no evidence of past neuritis. There was no P. L. and the pupils were dilated and motionless. On Oct. 3, 1903, she

was delivered of her first child at full term, but an hour afterwards she had considerable hemorrhage, and although the amount lost was not very great, yet she had never seemed to have really recovered from it.

It was doubtful when the failure of sight had commenced, but it had been suspected for some time. She had probably not seen at all for two months. There was no albumen throughout the pregnancy nor anything to suggest kidney disease.

Mr. Snell referred to a previous case he had seen in which the sight was greatly affected by the same cause, and he also alluded to other cases collected by Chevallereau.

A case of bilateral glioma cured by removal of the two eyes.

Mr. SNELL related this case. The patient was, when first seen on April 1, 1897, aged twenty-two months. Glioma of the retina was diagnosed and the eye was excised on April 7th. The tumor was confined to the globe, but was rather large. On Jan. 7, 1899, the child was again seen with a similar condition in the other eye; this was excised on March 1st and at the present time the child is alive and well.

Mr. Snell referred to the small number of cases in which both eyes had been removed for glioma without a fatal result.

Glioma occurring in two members of the same family, in one instance being fatal, both eyes being affected.

Mr. SNELL gave particulars of these cases. A girl, aged four and one half months, was sent to him on Dec. 18, 1903, with glioma of the right eye; the eye was removed on Dec. 22d. The growth was confined to the globe, which it nearly filled. There was no recurrence.

Another child of this family had suffered from glioma of both eyes which had proved fatal, the parents having refused to allow the removal of both eyes. There was one other child between these two who was alive and healthy.

Mr. Snell mentioned that until recently no instances had been published in which glioma had occurred in more than one member of the same family. Up to the present time three observers, besides himself, had recorded cases.

The PRESIDENT, Mr. STANFORD MORTON, and Mr. DEVEREUX MARSHALL mentioned interesting cases they had had of glioma bearing on the points brought forward by Mr. Snell.

On microphthalmos.

Mr. STEPHEN MAYOU gave a lantern demonstration on the anatomy of three cases of microphthalmos which he had examined.

Card specimens were shown by Dr. LOUIS WERNER, Messrs. E. E. HENDERSON, G. W. ROLL, E. W. BREWERTON, and Dr. D. RAYNER BATTEN.

REPORT OF THE MEETINGS OF THE OPHTHALMOLOGICAL SECTION OF THE NEW YORK ACADEMY OF MEDICINE.

By Dr. H. W. WOOTTON, Secretary.

MEETING OF MONDAY, APRIL 18, 1904. PRESIDENT DR. DUANE IN THE CHAIR.

Dr. J. E. Weeks presented two cases: (*a*) **Removal of a foreign body from the vitreous.** (*b*) **Case of facial hemiatrophy with ocular changes.**

(*a*) The patient was a plumber twenty-eight years of age. On March 19th, at 9.30 A.M., while he was cutting an iron pipe, a small piece of steel flew into the right eye, entering near the centre of the cornea, penetrating the lens, passing into the virteous chamber without injury to the iris. With the ophthalmoscope the piece of steel could be seen lying against the retina about 6*mm* below the optic nerve. Operation at 3.30 P.M., of the same day. The eye was approached to the Haab magnet in such a way that the piece of steel should be drawn into the posterior chamber just clearing the lower margin of the lens. The piece of steel presented in this location on the first application of the magnet. An attempt was then made to draw the steel into the pupillary space, but it became attached to the margin of the iris and could not be brought into the anterior chamber. A small T-shaped incision was then made through the cornea opposite the margin of the pupil in the outer-lower quadrant; the eye was again approached to the magnet and the particle of steel flew from the eye and became attached to the point of the magnet. A drop of blood escaped from the vessels of the iris. The iris was replaced. Healing with a circular pupil was obtained. Aside from a slight opacification of the

lens substance along the tract of the wound and in some of the posterior lamellæ of the lens, the eye suffered no appreciable injury.

(*b*) The second case was one of facial hemiatrophy, occurring in a woman thirty-one years of age. At the age of twelve the patient was struck on the head with a poker, rendering her unconscious for some time. About six months later the right side of the face began to atrophy, the process continuing for about twelve years. The right side of the face is markedly atrophic throughout the area of distribution of the branches of the fifth nerve. The osseous structures of the right side of the face are somewhat smaller than those of the left side. There is enophthalmos of the right eye of about 3*mm* apparently due to diminution of the orbital fat. The eyelashes are almost entirely wanting throughout a portion of the upper lid. The left iris is atrophic, the pupil much dilated and eccentrically placed. The dilatation of the pupil has been noticed about two years. The iris does not react to the influence of stimuli. The fundus of the eye is normal. Accommodation is fully preserved. V = $\frac{20}{40}$ +, with correction of the error of refraction. The iris of the left eye reacts normally to the usual stimuli. There is a left hyperphoria of four degrees.

Dr. DUANE presented a case of **unilateral rotary nystagmus.**

The patient, a woman of forty-eight, with probable incipient paralysis agitans, had a true rotatory nystagmus confined to the left eye. The oscillations, which were not constantly present, were one hundred and twenty to the minute and were particularly marked when the eyes were directed to the left. The condition, which was associated with an apparent oscillation of objects looked at, dated apparently from an attack of unconsciousness and delirium a year and a half previous. The movements of the eyes were normal, and the vision with the moderate myopic astigmatism corrected was $\frac{20}{20}$ in each eye. Correction of the refraction had apparently caused a marked diminution in the nystagmus. Dr. Duane commented on the well-known fact that unilateral nystagmus was usually vertical; unilateral rotary and unilateral horizontal nystagmus being extremely rare.

Dr. DUANE presented a simple **phorometer devised by Dr. W. A. Martin,** of San Francisco, and described in the *Ophthalmic Record* of March, 1904.

Dr. W. E. LAMBERT exhibited: (*a*) **A large foreign body removed by the Haab magnet.** (*b*) **A specimen in which the presence of the foreign body had not been detected and was only discovered after enucleation.** (*c*) **Case of extensive iridodialysis.**

Dr. WARD A. HOLDEN presented a case of **melanoma of the conjunctiva, which had passed over into the cornea.**

The case was one of melanoma of the conjunctiva in a negro girl that had extended *2mm* into the substantia propria of the cornea, but did not seem to have become sarcomatous.

In the discussion which followed Dr. LEZYNSKY had seen very few cases of facial hemiatrophy; he thought that little was known of the pathology, but that the symptoms must be due to involvement of the trophic fibres of the fifth nerve.

Dr. WEEKS stated that Gowers mentions a number of cases congenital or following debilitating diseases, but only one case that was due to injury.

Dr. POOLEY spoke of the value of the limitation of the field of vision in locating foreign bodies within the eyeball.

In regard to Dr. Lambert's case of **extensive iridodialysis,** he had known of a case in which the entire iris had been torn away during the performance of iridectomy. He also stated that in many cases of iridodialysis cataract followed at a later period. He had seen it do so a year after the injury.

Dr. E. S. THOMSON mentioned a case in which a foreign body had remained in the eye for fifteen years at the bottom of the anterior chamber, covered by exudate. Some siderosis had developed. Vision was perfect. He had seen a case in which the presence of the foreign body was detected by the existence of a marked limitation of the field of vision. In this case no response was elicited by the magnet. By making an incision down to the sclera over the situation indicated by the limitation of the field, the magnet, when then employed, removed a minute foreign body.

Dr. J. E. WEEKS thought that if the magnet did not succeed at first in removing a foreign body, it would be advisable to attempt removal near the equator of the lens where the incision could, if necessary, be made without injury to the eye. If the foreign body had originally passed through the sclera, he thought it better to attempt removal through the original opening, enlarging this slightly if necessary.

Dr. F. N. Lewis read the paper of the evening entitled: **Two cases of paralysis of the external recti muscles of the eye of tabetic origin, improved by operation.**

Both cases had suffered from diplopia for a considerable period of time before operation was performed. Operations had consisted of tenotomies of the interni. The cosmetic result in both cases was excellent, and both patients had acquired single vision in quite a large part of the field of binocular fixation. Both patients had been operated upon several years ago. There had been no change in the results up to the present time.

In the discussion, Dr. Pooley thought that very few such cases were cured by bichloride of mercury and iodide of potassium. In Dr. Lewis's cases diplopia developed as soon as the eyes were moved either side of the median line.

Dr. Lezynsky stated that tabetic pareses were known to vary very much in degree from time to time, and it was hardly safe to operate unless the paresis had lasted for a year at least. In Dr. Lewis's cases he thought the patients developed diplopia when the eyes were moved either side of the median line and, consequently, very much had not been gained.

Dr. J. F. Terriberry stated that in Dr. Lewis's cases the power of the externi had unquestionably improved. Whereas, before, the eyes could hardly be moved beyond the middle line, now they could be rotated almost to the external canthus.

Dr. Duane thought that the element of contracture was undoubtedly of great importance in paretic cases, and by dividing the antagonist of the paralytic muscles, we gave the paretic muscles a chance to recover. In Dr. Lewis's first case he thought recovery of the externus had probably been spontaneous. He also thought that iodide of potash and bichloride of mercury were successful quite frequently in cases of paresis of the ocular muscles, more frequently than could be accounted for by coincidence.

Dr. Lewis, in closing, thought that in the earlier stages of specific cases iodide of potash and bichloride of mercury were unquestionably of service.

MEETING OF MONDAY, MAY 16, 1904. PRESIDENT, DR. DUANE, IN THE CHAIR.

Dr. P. A. Callan presented a patient in whom the **cornea had regenerated** after having been destroyed by ulceration extending to Descemet's membrane. The patient was first seen

October 1, 1903. While working he had been struck in the eye with a piece of steel, which was removed from the cornea by a fellow workman. October 9th, there was a central ulcer 4*mm* in diameter and filled with a yellowish deposit; temperature, 101¾°, some albumen in the urine. The ulcer was cauterized and hot applications, leeches, and argyrol employed. The cauterization was repeated in forty-eight hours. The case became worse and in a few days all the layers of the cornea had disappeared except Descemet's membrane. He was discharged in two weeks, and prior to this, cauterization was employed for the entire surface. Dionin was used and the patient gradually began to see, and now most persons would take the case to be one of interstitial keratitis. Apparently, the cornea did not repair from the periphery, but repair took place at the same time over the whole surface. The question is, how was this repair effected? At present the upper part of the cornea is quite clear and vision is $\frac{1}{10}$.

Dr. Linn Emerson presented a case of **glaucoma.**

F. B., female, æt. fifty-three. July 1, 1902, D V = $\frac{8}{20}$ w + 2.75 S; S V = $\frac{8}{20}$ w + 2.00 S ⊃ + 2.50 cyl. at 135°. No history of glaucomal prodromata. History of periodic strabismus O S from early life.

March 14, 1904, acute glaucoma bilateral. Not recognized. Atropin for one week. Came under observation March 23d. Typical attack of acute glaucoma V = fingers at 6 ft. Eserine prescribed, and operation advised. Entered Orange Memorial Hospital the following afternoon. Operation double iridectomy under ether. Just before operation, fingers at 3 ft. Operation smooth. Relief from pain immediate. The next day after operation V = fingers at 12 feet. Improvement steady. Two weeks after operation fundus showed subsiding neuro-retinitis with numerous hemorrhages. Two months later fundus nearly normal.

D V = $\frac{8}{20}$ w + 2.00 cyl. axis 35°; S V = $\frac{8}{20}$ w + 1.50 S ⊃ − 6.00 cyl. axis 45°.

Visual acuity the same it was July 1, 1902, although patient had atropin one week and glaucoma eleven days without operation.

Dr. H. Knapp presented a child thirteen years of age. The patient exhibited an **elastic tumor,** extending to the outer canthus, in the upper and lower lids, on the right side. The tumor first made its appearance when the child was nine months

old and was then operated upon. It returned a year later and was again operated upon. Since then there has not been much trouble; it swells sometimes and the surface is uneven. When it swells it also becomes red and the patient suffers great pain; these symptoms may last two days. Eye tests were normal. Dr. Knapp suspected that the growth might be plexiform neuroma, but he had not so far met with this form of tumor in his practice. The scars from the previous operations were very large, extending backward from the ear and upwards on the temple. Dr. Knapp thought that the tumor ought to be removed. There was no doubt that the tumor to be seen at present was a recurrence and not a part of the growth left over from the other operations. Dr. Knapp stated that plexiform neuromata are congenital.

Dr. DUANE presented a girl of sixteen, whose left eye showed the peculiar **congenital anomaly** which has been so well described by Evans and others, and which is marked by some or all of the following symptoms:

1. Restriction, or more generally complete absence, of abduction in the affected eye.

2. Restriction, more or less marked of adduction, in the same eye.

3. An oblique upward or downward movement of the affected eye when it is adducted.

4. Retraction of the affected eye when it is adducted (this symptom was the only one absent in the case presented).

5. Contraction of the palpebral fissure of the affected eye when the eye is adducted.

6. Paresis or at least marked insufficiency of convergence.

Women are affected much more often than men, and the left eye is affected very much more often than the right. Dr. Duane reviewed the various theories that had been brought forward to account for the condition and especially for the retraction, viz., that (*a*) the internus tendon is inserted too far back; (*b*) that it is normally inserted, but has an additional slip inserted behind and acting as a retractor; (*c*) that the check ligaments are deficient; (*d*) that the externus is replaced by an inelastic cord, so that as the internus contracts the eye is pulled back, as a horse's head is when both reins are taut; (*e*) that in adduction the obliques are relaxed, and the eye is adducted by the superior and inferior recti. The last theory he thought disproved because observation shows that in these cases the obliques are not

relaxed— on the contrary, act very strongly — when the eye is adducted. The other conditions supposed, excepting the absence of check ligaments, have all been found by dissection to be actually present. The oblique upward or downward movements of the eye he thought were undoubtedly due to spasmodic action of the obliques.

Dr. DUANE exhibited Black's modification of Worth's **amblyoscope.** The two essential features of the modification are the addition of a vertical adjustment and the very simple means that Black employs for making the vision of the two eyes alike. As now constructed the instrument is a very practical one, and can be used without any special appliances and by ordinary daylight. Beside being employed for the purpose for which Worth devised it, *i. e.*, to teach squinting children the art of binocular vision and to diminish their squint, it may be used with great advantage in adults, particularly after operations or whenever we wish to train the eyes to work together. It can be applied in vertical squint or lateral squint combined with a hypertropia. It may also be used as a phorometer, as a substitute for prisms, for practising divergence and convergence, and in making a variety of physiological experiments.

In the discussion which followed, Dr. SCHAPRINGER could not understand how in Dr. Duane's case, when an outer movement was attempted, protrusion of the eyeball took place, except through the action of the obliques.

Dr. WOLFF thought that the forward movement was brought about by the abolition of the normal tonic contraction of the internal rectus when external rotation was attempted. He regarded the proptosis as more of a passive than an active process.

Dr. DUANE agreed with Dr. Schapringer that the propulsion in abduction might be due to the action of the obliques.

Dr. A. KNAPP read the paper of the evening entitled: **The influenza group of bacteria in conjunctivitis.** (Published in full in these ARCHIVES, vol. xxxiii., No. 4.)

In the discussion Dr. DUANE thought that most cases of acute conjunctivitis were mixed infections, and the more mixed they were the greater was the discharge and the more severe the symptoms.

Dr. A. KNAPP thought that faulty examination sometimes caused one to mistake the true organism at the basis of the trouble, for staphylococci would overgrow the Koch-Weeks bacillus.

SYSTEMATIC REPORT ON THE PROGRESS OF OPHTHALMOLOGY IN THE THIRD QUARTER OF THE YEAR 1903.

By Dr. G. ABELSDORFF, in Berlin; Prof. ST. BERNHEIMER, in Innsbruck; Dr. O. BRECHT, Prof. R. GREEFF, Prof. C. HORSTMANN, and Dr. R. SCHWEIGGER, in Berlin;

WITH THE ASSISTANCE OF

Prof. A. Alling, New Haven; Prof. E. Berger, Paris; Dr. Dalén, Stockholm; Prof. Hirschmann, Charcow; Dr. J. Jitta, Amsterdam; Dr. Krahnstöver, Rome; Mr. C. Devereux Marshall, London; Dr. P. von Mittelstädt, Metz; Dr. H. Schultz, Berlin; Prof. Da Gama Pinto Lisbon; and others.

Translated by Dr. Ward A. Holden.

Sections I.–III. Reviewed by Prof. C. HORSTMANN, Berlin.

I.—GENERAL OPHTHALOMLOGICAL LITERATURE.

311. **Schwarz, O.** The functional examination of the eye and its value in general diagnosis. Berlin, 1903. S. Karger.

312. **Baudry, S.** A medico-legal study of injuries of the eyes and appendages. Third edition. Paris, 1903. Vigot frères.

313. **Enslin.** Ophthalmology. Seventh part. *Stereoscopic-Medical Atlas* (Neisser), Leipsic, 1903.

314. **Stevenson.** Notes on surgical experiences of the Boer war. *Journ. of the Royal Army Medical Corps*, Aug., 1903.

Schwarz (311), in his small book, treats in an elementary way of the functional examination of the eye, and of the use of functional ocular disturbances in connection with the general examination in the diagnosis of general and nervous diseases.

BAUDRY (312) gives a detailed description of the accidental injuries of the eyes and their appendages, and also discusses simulation and aggravation; in conclusion, eye injuries in their relation to insurance.

In STEVENSON'S (314) paper the following case is recorded: A Mauser bullet traversed the skull horizontally, passing through both occipital lobes. Shortly afterwards the man was found to be conscious but totally blind. This continued for six hours and then began to disappear. At the end of six weeks the patient could find his way about, but the sight was very defective. There were, however, no other symptoms cerebral or otherwise.

MARSHALL.

II.—GENERAL PATHOLOGY, DIAGNOSIS, AND THERAPEUTICS.

315. **Nichalsy.** A conjunctivitis bacillus similar to the bacillus subtilis (bacillus conjunctivitis subtiliformis). Preliminary report. *Wratsch*, 1903, No. 34.

316. **Widmark.** The pathological action of strong lights upon the eye. *Hospitalstid.*, July 8, 1903.

317. **Bjerrum.** How does the pain of photophobia arise? *Ibid.*, May 6, 1903.

318. **Graeflin.** Experimental investigations on the injurious effect of powdered anilin colors on the rabbit's conjunctiva. *Zeitschr. f. Augenheilk.*, x., p. 1903.

319. **Nieden.** The treatment of acute purulent affections of the interior of the eye. *Ophth. Klinik*, 1903, No. 15.

320. **Rymowitsch.** Experiments with serum therapy in cases of streptococcus infection after cataract extraction. *Wjest. Ophth.*, 1903, Nos. 4–5.

321. **Schaumann.** On the frequency and clinical significance of inequality of the pupils, with remarks on the so-called alternating (springende) mydriasis. *Finska läkäretallsk. handl.*, March, 1903.

322. **De Schweinitz** and **Edsall.** Concerning a possible etiological factor in tobacco-alcohol amblyopia, revealed by an analysis of the urine in cases of this character. *Am. Journ. Med. Sciences*, Aug., 1903.

323. **Dean, L. W.** The influence of consanguinity on the organs of special sense. *Journ. Amer. Med. Assoc.*, Sept. 12, 1903.

324. **Ellett.** Control of suppuration in the anterior segment of the eye. *Ibid.*, Aug. 8, 1903.

NICHALSY (315) observed an epidemic of acute conjunctivitis in the dusty manufacturing town of Lodz, which was due not to the Weeks or Morax-Axenfeld bacilli but to a small bacillus similar to the bacillus subtilis. Cultures of this bacillus rubbed on the conjunctiva of animals caused a transient inflammation and when injected into the vitreous a panophthalmitis. The au-

thor wishes to stimulate the search for this bacillus in conjunctivitis occurring in dirty manufacturing towns.

HIRSCHMANN.

WIDMARK (316) sums up his well-known investigations on the pathological action of strong lights upon the eye as follows:

1. Snow blindness and electric ophthalmia are due to the ultra-violet rays. The luminous rays here are of little importance.

2. The changes in the retina are caused by the luminous rays, which bring about chemical changes. The ultra-violet rays here are of lesser importance.

3. The heat rays have little or no importance either with respect of the changes in the anterior media or of those in the retina, probably because they are absorbed by the liquids of the ocular media and thus thermic action upon the tissues is prevented.

DALÉN.

BJERRUM (317) maintains, in opposition to Nagel and Axenfeld, that the contraction of the pupil plays no special rôle in the production of photophobia, for the following reasons:

1. The idea that the pain in photophobia is caused by contraction of the pupil does not agree with the fact that the highest grade of painful photophobia is often observed with quite superficial affections of the cornea and the photophobia is less pronounced in deeper affections with well-marked iritis.

2. The pain is often more severe than that after the instillation of eserine into the normal eye though the pupil is equally small. The pain following the use of eserine is perhaps caused by the contraction of the ciliary muscle.

3. Painful photophobia is observed in patients with large immobile pupils—*e. g.*, in cases of coloboma and the like.

4. The pain and photophobia are, as a rule, unilateral symptoms. They come on only when light falls into the diseased eye, and are felt only in or about this eye, although both pupils usually contract equally when light falls into the eye.

The author maintains, as he has previously done, that the pain arises reflexly from the light-perceiving portions of the brain through the sensory tract of the eye rendered hyperæsthetic by the disease. With this explanation it is comprehensible why cocaine relieves the photophobia of superficial affections of the cornea more than is done by atropine. The author finds a certain analogy between these pains and the dysæsthesias which are sometimes produced by rasping sounds. DALÉN.

Graeflin (318) put powdered anilin colors into the conjunctival sacs of fifteen rabbits. In the group of injurious colors are crystal violet, victoria blue, malachite green, prune, safranin, auramin, rhodamin B, rhodamin 6 G, and methylene blue. In the group of non-injurious are the neutral anilin colors Congo, Tartrazin, direct blue, direct black, eosin, and water blue. The most irritating of the former group are crystal violet, victoria blue, and malachite green. The final outcome of the inflammatory processes set up by these three colors was in every instance panophthalmitis which entirely destroyed the eye. Methylene blue is the least irritating of the former group, sometimes affecting the conjunctiva only and sparing the cornea.

Of 77 cases in which the human eye had been injured by these colors — cases corresponding exactly to the experiment, keratitis was found in 33 and conjunctivitis in 44.

Nieden (319) states that if suppuration in the anterior segment of the eye follows infection, as it frequently does after injuries of the cornea, sclera, and iris, the process is improved by energetic cauterization of the infected wound. It is also proper to open the anterior chamber and syringe it out repeatedly with strong antiseptic solutions.

When the posterior segment of the ball, including the uveal tract and vitreous, is infected, four courses are open—subconjunctival injections, prolonged mercurial inunctions, the introduction of iodoform pastilles, and the use of the galvano- or thermocautery.

Rymowitsch (320) conducted a series of experiments in order to learn the curative effect of anti-streptococcus serum on streptococcus infection after eye operations. The experiments were divided into three groups: (1) with infection of non-perforating wounds, (2) with infection of the anterior chamber, and (3) with infected wounds of the cornea after extraction of the lens. The serum was injected subcutaneously or subconjunctivally. When 0.6*cc* of the serum was injected twelve hours before the inoculation, the disease did not develop. When only 0.3*cc* of serum was injected inoculation caused panophthalmitis. Injection within eight hours after inoculation lessened the symptoms, and if repeated led to recovery. Injections twelve hours after the inoculation had no effect upon the course of the disease and the eye was lost. Injections after inoculation of the interior of the eye had no effect whatever. In general one can expect

good results in cases of infection of the cornea after extraction, if the micro-organisms have not yet entered the anterior chamber or the deeper parts of the eye, and if the injections are made early. The injections are of no value when the infection is deep in the eye. HIRSCHMANN.

SCHAUMANN (321) states, first, that previous reports indicate that inequality of the pupils is much more frequent in persons with internal disorders than in the healthy, namely, 18–46 % in the former and 1–10 % in the latter. The author examined 1186 out-patients and 727 patients in the medical department of a hospital. Of the former 27.9 % had inequality of the pupils; of the latter 37.8 %. Inequality was found as often in men as in women. The inequality was sometimes lasting, sometimes transitory. The light reaction was always good except in 9 patients who had organic nervous disease.

He describes eleven cases of alternating mydriasis, which he believes is not to be regarded as an initial symptom of paresis or tabes unless the light reflex is lost. Simple inequality of the pupils is a constitutional peculiarity to be classed with the somatic stigmata of degeneration, and it has little diagnostic importance. DALÉN.

There seems to be a growing belief that the chronic effects of certain poisons are produced not by the direct action of the poison itself, but indirectly through disturbances in nutrition. Following this hypothesis, DE SCHWEINITZ and EDSALL (322) conducted a series of analyses in patients affected by tobacco-alcohol amblyopia, with the view to determine whether the lesions of this disease are associated with any constant change, especially in the physiology of digestion. The results lead to the conviction that the disturbances of digestion, or metabolism, arising from the continued use of alcohol or tobacco are the origin of toxic substances, and that these are, at least in part, the cause of the amblyopia. Seven patients were subjected to exhaustive examination according to modern methods of analysis. The examination of the blood, blood pressure, and fæces yielded no positive results. In five cases, in which the stomach contents were examined, evidences of marked gastritis were found. In the urine analyses no permanent albuminuria was found, but in all cases the products of intestinal decomposition and urobilinuria, due to disturbance of the liver, were discovered

ALLING.

DEAN (323) states that of 181 blind children in the Iowa College for the Blind, 9, or about 5%, were the result of consanguineous marriage. Excluding those cases made blind from acquired disease, 14% of those suffering from congenital conditions were the result of consanguineous marriage of the first degree. He cites cases of retinitis pigmentosa, albinism, coloboma of iris and choroid, microphthalmos, cataract, and atrophy of the optic nerve. ALLING.

ELLETT (324) records the results of introduction into the anterior chamber of the rabbit's eye of rods of iodoform, according to the method originally suggested by Ostwalt. Infection was obtained by injections of cultures into the anterior chamber. Iodoform used in three cases of streptococcus infection. One failure, two successes. Iodoform used in two cases of staphylococcus infection. Two successes. One case of streptococcus infection was not treated and the eye was lost. The rods were made of 50% iodoform in gelatin. The mixture was heated to sterilize and cut up after cooling. ALLING.

III.—INSTRUMENTS AND REMEDIES.

325. **Heerfordt.** The sterilization of catgut. *Hospitalstidende*, May 6, 1903.

326. **Pick.** Alsol in ophthalmology. *Therapeutische Monatshefte*, July, 1903.

327. **Smith, Priestley.** A balance for knife testing. *Ophth. Review*, August, 1903.

HEERFORDT (325) sums up the results of his experiences with catgut, sterilized according to Hofmeister's method, as follows:

1. Sterilization of catgut ooo in 4% formalin is impossible without rendering the threads brittle.

2. After partial sterilization of the catgut in formaldehyde, complete sterilization by boiling can be obtained only when the gut is boiled until it becomes brittle.

3. A washed, boiled, formalinized, sterile thread iritates but little when introduced into the cornea of a rabbit.

4. A catgut thread containing attenuated micro-organisms can under certain conditions be absorbed from the cornea or anterior chamber of a rabbit without much evidence of irritation or inflammation. DALÉN.

PICK (326) used alsol, aluminium acetico-tartaricum in ¼ to ½% solution for irrigation and bathing the eyes in cases of blennor-

rhœa, acute and chronic conjunctivitis and trachoma, scrofulous ophthalmias, and hordeola.

This instrument has been introduced by PRIESTLEY SMITH (327) for the purpose of being able to test the points and edges of knives, etc., and comparing them. It consists simply of a balance, on one end of which is an ordinary drum with leather stretches across, and on the other limb of the balance is a weight which by sliding it along can be made to vary the pressure from 0 to 18 grammes. In this way comparison of points and edges can easily be made. The instrument is made by R. Bailey, Optician, Bennett's Hill, Birmingham. MARSHALL.

Sections IV.–VII. Reviewed by DR. G. ABELSDORFF, Berlin

IV.—ANATOMY.

328. **Tartuferi.** On the elastic tissue of the cornea and a particular method of metallic impregnation. *Graefe's Archiv*, lvi., 3, p. 419.

TARTUFERI (328) brought to view the elastic fibres by using the combined action of sulphate of soda and chloride of silver to gain a metallic impregnation. He found by this method that in the peripheral and central portions of the cornea in man and the mammalia the presence of numerous elastic fibres which in the form of a circumfascicular network made up a strong supporting elastic framework.

V.—PHYSIOLOGY.

329. **Guttmann.** Direction of gaze and estimation of size. *Zeitschr. f. Psychol. u. Physiol. d. Sinnesorgane*, 32, p. 233.

330. **Rosenbach.** On uniocular supremacy in binocular vision. *Münch. med. Wochenschr.*, 1903, xxx., p. 1290.

331. **Hirsch.** On uniocular supremacy in binocular vision. *Ibid.*, No. 34, p. 1461.

332. **Bjerrum.** On binocular vision. *Hospitalstid.*, xxix., July, 1903.

333. **Parsons, J. Herbert.** The effect of increased intracranial circulation upon the ocular circulation in the dog. *Journal of Physiol.*, vol. xxix., No. 3. (Published in full in *R. L. O. Hospital Reports* for 1903.)

GUTTMANN (329) discusses the question whether the estimation of size depends upon the position of the eyes in the head with reference to the object looked at. Zoth has recently answered the question in the affirmative, since the moon in the horizon appears larger than the moon in the zenith. Guttmann experimented with pairs of lines adjustable in their distance

apart arranged on a perimeter arc at 6° and at 40° above the horizontal. The distance apart of the lines was underestimated 3.66% in the elevated position. Circular discs appear 3.5% smaller at an elevation of 40° than on a level with the eyes, other conditions being the same.

ROSENBACH (330) states the well-known fact that when the vision of the two eyes is approximately equal and a person is directed to hold his finger in the sagittal line the finger will be held before the right eye—that is, the right eye aims.

HIRSCH (331) finds that the statement above is true when he uses the finger of the right hand, but that when he uses his left hand the left eye aims.

BJERRUM (332) by direct observation and anatomical examination has found that the eyes of the owl are immobile, and he discusses the question how far binocular vision exists for this bird. The anatomical axes of the eyes diverge from 30° to 60° in different species of owls. In a horizontal section through the owl's skull with the eyeballs in position, Bjerrum finds that a horizontal line through the middle of the cornea, parallel with the median plane, and passing through the centre of the cornea, impinges on the temporal margin of the retina. But direct observation of the points where sunlight fell on the two retinas showed that when one image fell on the temporal margin of one fundus, the other fell about in the middle of the other fundus. When the skull was placed in the centre of a perimeter, it was found that a light threw its rays upon the retina of each eye, so long as it was not moved farther than 20° from the middle point of the arc. This would mean a binocular field of 30° to 40°. The author regards it as probable that binocular vision exists within this field. If this is true, and the eyes are immobile, the correspondence of the two retinas must differ much from that of man. The author in conclusion discusses Nagel's projection theory, and adds some observations on the vision of patients with squint, and the importance of the horizontal extension of the area centralis retinæ in certain animals. DALÉN.

VI.—REFRACTION AND ACCOMMODATION.

334. **Seggel.** My experience regarding the onset and progress of myopia and the influence on the latter of full correction. *Graefe's Archiv*, lvi., 3, p. 551.

335. **Senn.** Corneal astigmatism and central choroiditis. *Arch. f. Augenheilk.*, xlviii., p. 191.

336. **Cantonnet.** Mariotte's spot and Mariotte's region in the myope. *Arch. d'opht.*, xxiii., No. 8.

337. **Bull, George.** The accommodative asthenopia of Donders. *Ann. d'ocul.*, cxx., p. 154.

338. **Frost, W. Adams.** The operative treatment of myopia. *The Ophthalmoscope*, July, 1903.

SEGGEL'S (334) report is based on the observation of 2070 myopes, 451 of whom had their myopia under-corrected. In a period of observation of seven to nine years, the myopia was stationary in 43.4 % of the full-corrected myopes and in only 22.3 % of the under-corrected. The good effect of full correction is particularly noticeable in children under fourteen. Seggel gives the full correction in young persons when the myopia is above 1.25 D and the accommodation is good. The age of fifteen to sixteen years is the most dangerous in regard to the development and increase of myopia.

SENN (335) believes from a study of statistical material that an etiological connection exists between corneal astigmatism and central choroiditis in myopia. He designates as abnormal astigmatism any astigmatism against the rule and any above 1.25 D with the rule. Among 205 myopic eyes with central choroiditis he found such an abnormal astigmatism in 78.1 %. In all the eyes with myopia above 7 D and without choroiditis observed in the same period only 27.6 % were astigmatic.

CANTONNET (336) divides the myopes with enlargement of the blind spot into three groups: (1) those with a circular or lateral conus of at least one disc diameter; (2) those with a narrower conus; and (3) those with no actual conus but with choroidal changes in the neighborhood of the disc particularly to the temporal side. The first and second groups have an enlargement of the blind spot corresponding to the conus, sometimes larger for colors than for white, and sometimes with slight metamorphopsia near the margins.

About this enlarged blind spot is a relative scotoma for white and corresponding scotomata for colors, usually in the normal sequence but sometimes reversed. This relative scotoma, which the author calls "Mariotte's region," sends processes out toward the periphery, sometimes even to the contracted limits of the color fields, so that there may be notches in the color fields

extending from the periphery to the blind spot. Mariotte's region agrees in no way with the blind spot and may be most extensive in cases lacking a conus. It corresponds to the circumpapillary changes which ophthalmoscopically appear as a rarefaction of the pigment of the choroid, or when they consist in stretching of the choroid may not be recognizable.

The examination of the fields is therefore of prognostic value, particularly if later examinations shall show that the scotomatous processes from Mariotte's region increase in number or in extent in direct relation to the increase in myopia.

v. MITTELSTÄDT.

BULL (337) from his own observations believes that the existence of Donders's accommodative asthenopia has not been proven. If Donders's view was correct, the asthenopic symptoms must be more pronounced in hyperopia of high degree when the ciliary muscle is most strained. But Bull has found with low degrees of hyperopia the severest forms of asthenopia, which he attributes to insufficiency of the muscles. He again recommends the stereoscope of Holmes for determining the rôles which convergence and accommodation play in the causation of asthenopia.

In this communication FROST (339) gives a short account of the history of the operation for this disease. He then refers to a series of cases he has operated upon in which there were 31 patients and 33 eyes. The average age of the patients was nineteen and one half years. The oldest patient was forty-eight. It may be taken as a rule that the operation is only suitable with myopia of over 12 D.

The method in which improvement is brought about and the theory of refraction after the removal of the lens are clearly put forward. He operates, as a rule, by freely needling the lens and then letting it out several days later in the same way as a lamellar cataract is commonly treated. He then gives details of the cases he has operated upon and concludes by saying: (1) That no case should be operated on which has not at least 12 D of myopia. (2) The patient should be able to read J1 without glasses with each eye. (3) After removal, the distant vision without glasses is usually as good as it was with glasses before the operation, and with correction it is usually much better. (4) The operation should be limited to the more myopic eye, except under special circumstances. MARSHALL.

VII.—MUSCLES AND NERVES.

339. **Fejér.** On injuries of the ocular muscles. *Arch. f. Augenheilk.*, xlviii., 3, p. 264.

340. **Bielschowsky.** The clinical picture of paralysis of associated movements and its value in topical diagnosis. *Münch. med. Wochenschr.*, 1903, No. 39, p. 1666.

341. **Weinhold.** A remarkable case of voluntary dissociation of eye movements. *Klin. Monatsbl. f. Augenheilk.*, xli., 11, p. 103.

342. **Péchin** and **Rollin.** Ophthalmoplegia and arteriosclerosis. *Arch. d'opht.*, xxiii., No. 9.

343. **de Wecker.** The rôle of Tenon's capsule in strabismus operations. *Ann. d'ocul.*, cxxx., p. 5.

344. **Jensen.** Remarks on the etiology of squint. *Hospitalstidende*, 1903.

345. **v. Michel.** On family and congenital unilateral disturbances in the innervation of the cervical sympathetic. *Zeitschr. f. Augenheilk.*, x., 3, p. 181.

346. **Turner, William Alden.** Two cases of oculomotor paralysis with headache. *The Ophthalmoscope*, Aug., 1903.

347. **Firth, A. H.** A case of ophthalmoplegia. *Lancet*, March, 1903.

348. **Clarke, Ernest.** Hereditary nystagmus. *The Ophthalmoscope*, Sept., 1903.

FEJÉR'S (339) patient was a boy of nine, who had received an injury with a sabre at the inner canthus of the right eye. After the conjunctival wound was healed, diplopia was noticed and was referred to a paralysis of the internal rectus and perhaps of the inferior oblique. The diplopia disappeared after a week, from which the author concludes that in such cases it is not necessary to suture immediately the cut ends of the muscle.

BIELSCHOWSKY (340) observed a patient with apparent complete paralysis of the left external rectus. Both internal recti acted well in convergence but appeared paretic when lateral movements were performed. Nevertheless, the muscles turning the eyes to the left could be brought into action by having the patient fix an object and then turn the head suddenly to the right. Fixation would be maintained until the head was held still, when the eyes assumed their previous position.

The author calls attention to the difficulty of determining the existence of lateroversion according to the method used. He localizes the focus as being frontal to the abducens nucleus so that particular portions of each longitudinal bundle are injured. For the fibres, which here come from the labyrinth (vestibular nerve) to the nuclei of the ocular muscles and permit the reflex

excitation of the muscles causing lateroversion, must be capable of conducting. And the tracts from the cortex to the nuclei cannot be entirely cut off.

WEINHOLD (341) found in a man of twenty-three, whose eyes were otherwise normal, the ability to squint upward with the left eye at will. The corresponding double images were seen.

In the case reported by PÉCHIN and ROLLIN (342), a syphilitic man of sixty-four, with arterio-sclerosis, particularly of the aorta, chronic nephritis, and tabes, had a complete external ophthalmoplegia and optic-nerve atrophy of the left eye, and an incomplete ptosis and paralysis of the superior rectus of the right.

Instead of the assumed nuclear changes there was found at the autopsy a marked dilatation of the left carotid, particularly in its course in the cavernous sinus, where it compressed the nerves lying on the outer wall, and the dilated left ophthalmic artery compressed the optic nerve. On the right side there were similar but less marked changes. v. MITTELSTÄDT.

DE WECKER (343) discusses three new modifications of the operative treatment of squint by capsular advancement: (1) The capsule ligature suggested by Trousseau; (2) the graduated plastic tenotomy of Verhoeff; and (3) the musculo-capsular advancement of Jocqs. Opposing these newer methods, de Wecker defends his original method, the advantage of which is that by doing a capsular advancement and a tenotomy of the antagonist on a squinting eye a strabismus of 50° or more can be corrected without causing the patient to give up his ordinary occupation. If the operation is correctly done, it need not be feared that an unpleasant fold will remain at the site of the advancement. BERGER.

According to JENSEN (344), heredity is the most important factor in the etiology of squint, it existing in seventy per cent. of cases. What is inherited is not the squint itself but the lack of ability to acquire binocular vision and thus the correct position of the eyes. When the tendency to fusion does not exist, it depends upon external conditions whether the eyes remain straight, or converge, or diverge.

The amblyopia accompanying squint is neither the result nor the cause of the squint. It is a symptom accessory to the squint, and depends upon the fact that the unused eye remains at the stage of development in which it was at birth. A low degree of amblyopia, with preservation of the power of central fixation,

occurs when the squint is alternating or when an alternating squint later becomes unilateral. The hereditary defect may be absolute or relative; in the latter case squint need not necessarily occur, but its development is favored by particular factors, such as temporary weakening of accommodation, acquired irregularities of the refracting surfaces, hyperopia, and the like. DALÉN.

v. MICHEL'S (345) patient was a boy of nine, in whom, since birth, the right palpebral aperture was wide, with a low degree of right exophthalmus, redness of the right half of the face, and paresis of the elevators of the right eye. These symptoms on the part of the sympathetic were regarded, since the boy was born of nervous parents, as "a stigma of neuropathic degeneration."

TURNER'S (346) first case was that of a girl aged eighteen who suffered from childhood with periodic headaches. These recur every fortnight. Since thirteen years of age she has had severe attacks followed by ocular paralysis, which has lasted as long as seven weeks. Her general health is otherwise good. The second case was a man aged twenty-seven who had suffered from severe headaches since childhood. The present attack, which ended with the paralytic symptoms, had lasted fourteen days when seen. The case is incomplete as the patient has not been seen since.

The true nature of the disease is obscure, but the patients usually come from a neurotic family. MARSHALL.

FIRTH'S (347) patient was a woman aged thirty-four, in whom the condition was said to have been induced by a severe chill. On the right side there were ptosis, complete immobility of the eyeball, and loss of pupillary action to both light and accommodation. The condition improved under iodide of potassium and counter-irritation. MARSHALL.

In the remarkable family history, reported by CLARKE (348), the point of greatest interest is this: No female suffered from the defect, but the eldest female transmitted it to her male offspring, and through her eldest girl to the male grandchildren, and so on. This continued for five generations. MARSHALL.

Sections VIII.–XII. Reviewed by DR. R. SCHWEIGGER, Berlin.

VIII.—LIDS.

349. **Terson.** The dermatological classification of blepharitis ciliaris. *Ann. d'ocul.*, CXXX., p. 41.

350. **De Lapersonne.** On some modifications of the ptosis operation. *Arch. d'opht.*, xxiii., 8, p. 497.

351. **Lotin.** A case of primary melanosarcoma of the lid. *Wratsch*, 1903, No. 28

352. **Worth, Claud.** An operation for the relief of congenital ptosis. *The Ophthalmoscope*, July, 1903.

TERSON (349) proposes a classification of the affections of the lid margins in accordance with the dermatological views of Besnier and Brocq. He distinguishes two main groups: the suppurative and the squamous. The former are mostly affections of the hair follicles—folliculitis either of the ducts—parafolliculitis—or of deeper parts. Ulcerous blepharitis with its results, such as hypertrophy, cicatrization, alopecia, is a process analogous to sycosis. Staphylococci are often present, the aureus more frequently than the albus.

In the squamous form he includes seborrhœa, of which two varieties are to be distinguished—one with deposits either oily or fatty and blepharitis furfuracea, which corresponds to pityriasis simplex of the hair of the scalp and brows. BERGER.

In cases of ptosis from incomplete paralysis of the levator, DE LAPERSONNE (350) advances the muscle. An incision 4 to 5 *mm* above the margin of the lid and parallel with it exposes the tendon of the levator. At each end of this incision he makes a short vertical incision down to the conjunctiva in order to take up the tendon on a squint hook. After the introduction of sutures the attachment of the tendon to the tarsus is divided, and when the sutures are knotted the tendon is drawn down and fixed. The effect is increased by resecting a portion of the tendon. The fold, composed of skin and orbicularis, formed at the lower margin of the wound is excised and the wound closed with sutures. The author is well satisfied with the results obtained in four cases. V. MITTELSTÄDT.

A spherical tumor the size of a small apple, in the left lower lid of a man of twenty-six, removed by LOTIN (351) proved to be a spindle-celled melanosarcoma with foci of inflammatory infiltration, necrotic foci, and hemorrhages in the tissues. The tumor seemed to have started at the margin of the lid. This was the sixtieth case of the sort on record. HIRSCHMANN.

The operation described by WORTH (352) consists in inserting kangaroo tendon sutures from the eyebrow to the margin of the lid in such a way that it attaches the lid to the occipito-frontalis

muscle. The suture is entirely buried and no knots are tied which make elevations on the skin. MARSHALL.

IX.—LACHRYMAL APPARATUS.

353. **Baas.** A case of symmetrical tumors of the lachrymal glands, eyelids, and glands of the buccal mucosa. *Zeitschr. f. Augenheilk.*, x., 3, p. 184.

354. **Moisonnier.** Cylindroma of the lachrymal gland. *Arch. d'opht.*, xxiii., 9, p. 562.

355. **Awerbach.** Fungus concrements in the canaliculi. *Wratsch*, 1903, Nos. 26 and 27.

356. **Terson.** Nature and treatment of prelachrymal tumors. *Arch. d'opht.*, xxiii., 7, p. 430.

357. **Knapp, Arnold.** Extirpation of the lachrymal sac; its indications and technique. These ARCHIVES, xxxii., 4, p. 372.

The old man described by BAAS (353) had great tumors in the upper lids and between the upper lids and the roof of the orbit and also in the mucous membrane of the cheeks. After some of the tumors had been excised, the lids could be raised again, and further improvement followed the use of arsenic.

AWERBACH (355) reports a case of concrements in the lower canaliculus which proved to be actinomyces, and after discussing the literature of the subject he concludes that all the reported cases of leptothrix and streptothrix were in reality cases of actinomyces. HIRSCHMANN.

In TERSON'S (356) case a small cystic tumor lay before the lachrymal sac, with which it had no connection. The lachrymal passages were normal. After puncture and evacuation of the purulent contents of the cyst it grew to the size of a hazel-nut. Recovery followed the excision of the anterior wall of the sac, whose structure was similar to that of the lachrymal sac, with curettage and cauterization. Even at the operation no connection with the lachrymal sac could be made out. There had probably been a diverticulum of the sac which had become cut off. V. MITTELSTÄDT.

X.—ORBIT AND NEIGHBORING CAVITIES.

358. **Heerfordt.** On the entrance of air into the orbit. 15th Congress at Copenhagen. *Hospitalstid.*, May 6, 1903.

359. **Petit.** Spontaneous recurrent hematoma of the orbit. *Ann. d'ocul.*, cxxx., p. 112.

360. **Weiss.** Pathological and clinical contributions to the subject of orbital phlegmon. *Zeitschr. f. Augenheilk.*, x., 1, p. 16, and 2, p. 91.

361. **Ramsay, A. Maitland.** The cosmetic value of paraffin injections after enucleation of the eyeball. *Ophth. Review*, July, 1903.

362. **Parsons** and **Rockliffe.** Plexiform neuroma of the orbit. *Path. Soc. of London*, May 19, 1903.

363. **Collins, C. J.** Three cases of ligature of the common carotid artery. *Lancet*, April 18, 1903.

364. **Hotz.** A case of syphilitic orbital periostitis and optic neuritis in which vision was almost extinguished but completely restored. *Ophth. Record*, July, 1903.

HEERFORDT (358) gives a detailed description of emphysema—the purely orbital and the orbito-palpebral. He regards the purely palpebral form as extremely rare, the cases so described being mostly orbito-palpebral. In the orbital form the air enters through a communication with the accessory cavities of the nose behind the orbito-palpebral membrane and remains here. In the orbito-palpebral form, the mechanism is the same except that the orbito-palpebral membrane ruptures and the air passes forward under the skin of the lid. DALÉN.

PETIT (359) observed in two cases the occurrence of hemorrhages into the orbit without any external cause. The main symptom was an exophthalmus developing within a few days. There was kidney disease in each case and the hemorrhages were attributed to vascular changes. In the great majority of the fifteen cases in the literature there were vascular changes due to kidney disease or hæmophilia. BERGER.

In one case, described by WEISS (360), the phlegmon of the orbit proceeded from the antrum of Highmore or the ethmoid cells and spread without apparently following the veins. A cerebral abscess in the frontal lobes, which caused the patient's death, sprang probably from a circumscribed inflammation of the periosteum, which led to perforation of the bone at the frontal-ethmoid junction. In the other case, the pterygoid process was the point of origin from which an abscess spread into the neighboring tissues. The venous network was eroded and the suppuration spread into the face and orbit, sparing the eye, and finally into the cavernous sinus and the other orbit and into both eyes. General sepsis caused death.

In a previous paper in the *Lancet*, RAMSAY (361) described the operation he had done twenty times, and since that time he has done twelve additional cases, and in this paper he gives his later experience and the detailed method of performing the operation. The conjunctiva is divided as close as possible to the cornea and

a catgut suture is placed in each divided rectus. The eye is then enucleated in the usual manner and the cavity is packed with gauze wet with adrenalin. A strong silk purse-string suture is then passed round the opening, the packing is removed, and the dry cavity is then filled with paraffin melting at 104° Fahr. A special syringe is used made by Messrs. Down Bros.

The author is careful to point out that this method should not be used should the eye be suppurating, and although the paraffin does sometimes come out yet he is very pleased with the cosmetic effect and the reaction after it is not very great.

MARSHALL.

PARSONS and ROCKLIFFE'S (362) patient, from whom the specimen was obtained, was a child aged two years. There was pulsating exophthalmos, and after tying the carotid artery the orbit was exenterated, but the child died shortly after the operation. The growth was a plexiform neuroma which had caused absorption of the roof of the orbit and had become intracranial.

MARSHALL.

Of the three cases in which this operation was done by COLLINS (363), one was for the relief of an intracranial aneurism. The patient was a man aged fifty-four, who as the result of a fall a month before had developed the condition. Diplopia was noticed three days after the accident, and when seen there was pulsation around the globe, and a loud bruit could be heard over the right frontal and temporal regions. The vision was $\frac{6}{9}$ and J1.

The right common carotid artery was tied immediately above the the omo-hyoid muscle. The pulsation and bruit at once ceased, but some proptosis remained, and there was also some ectropion of the lower lid from solid œdema of the conjunctiva; while under observation there was no return of the bruit or pulsation.

MARSHALL.

A man of forty-nine, who had had chancre twenty years before, consulted HOTZ (364). He found R V = fingers, six inches; L V = fingers, ten feet. The inferior nasal quadrant of the field was gone in each eye. The discs showed swelling and congestion with dilated veins. There was orbital pain with back pressure over the eyeballs and some exophthalmos. The patient had suffered almost continuously from frontal headache for six weeks. Energetic anti-syphilitic treatment brought about recovery with complete restoration of vision in two months.

The affection probably started as a periostitis of the orbital wall of either side, with swelling of the orbital tissues and inflammation of the nerves. ALLING.

XI.—CONJUNCTIVA.

365. **Jundell.** The action of anti-streptococcus serum in a case of membranous streptococcus conjunctivitis. *Hygiäa*, 1903.

366. **v. Haaften.** On the rôle of the staphylococci in the development of scrofulous and eczematous ophthalmia. *Inaug. Dissert.*, Amsterdam, 1903.

367. **Hunt, E. Henderson.** Notes on a case of double subconjunctival hemorrhage caused by compression of the chest. *St. Bartholomew's Hosp. Reports*, 1902.

368. **Pearson, A. C.** Chicken-pox eruption on the conjunctiva. *Brit. Med. Journ.*, June 27, 1903.

369. **Brewerton, E. W.** The bacteriology of conjunctivitis. *Lancet*, April 11, 1903.

370. **Posey.** Verna conjunctivitis. *Journ. Amer. Med. Assoc.* July 25, 1903.

371. **Wood, Casey A.** Excision of the so-called cartilage in cases of chronic trachoma. *Amer. Jour. of Opthth.*, July, 1903.

372. **Johnson, R. H.** Papilloma of the conjunctiva and cornea. *Annals of Ophth.*, July, 1903.

373. **Henderson, F. L.** A case of tuberculosis of the conjunctiva. Recovery without local interference. *Ibid.*

JUNDELL'S (365) patient was an infant one year old, with a croupous streptococcus conjunctivitis. On the seventh day he injected 5 *cc* of antistreptococcus serum, and on the following day 5 *cc* more. In this case the serum had neither a curative nor a preventive effect. Indeed, it is not certain that it was not detrimental. DALÉN.

Many persons believe that the so-called scrofulous ophthalmia is caused by bacteria reaching the eye from without. Others believe that there are constitutional causes. In the books it is generally stated that staphylococci are present, as a rule, in scrofulous eczematous affections.

VAN HAAFTEN (366) has studied 39 patients with benign scrofulides, examining the conjunctival, nasal, and buccal secretions. In 51 eyes he found: no staphylococci in 20, a few in 8, more than 5 in 23, and more than 40 in 14. In but 15 cases did he find staphylococci in the nose and mouth. By way of control he examined 45 normal eyes, finding no staphylococci in 30,a few in 9, more than 5 in 6, and more than 40 in 2 cases. This

shows that in the normal conjunctival sac staphylococci are often present (as is well known), but not in such numbers as in the scrofulous eyes.

While the staphylococcus may play some rôle in the production of scrofulous ophthalmia, the obstinate cases seem to depend upon a constitutional cause—chiefly tuberculosis. Experiments on animals' eyes showed that the effects of the inoculation with staphylococci were more pronounced in animals that had been previously inoculated with tuberculosis. JITTA.

HUNT'S (367) patient was a carman, aged thirty-nine, who, while driving a van weighing two tons under an archway, became jambed beneath it while leaning forward and endeavoring to pass. He was unconscious when admitted and had double subconjunctival hemorrhages, which overlapped the corneæ, and there was ecchymosis of the eyelid. Fracture of the base of the skull was diagnosed. However, the patient got quite well and left in six weeks. In all probability the skull was not fractured, but the ecchymosis was caused by rupture of orbital veins consequent on excessive intrathoracic pressure. Of ten other cases of crush admitted, 8 resembled the above, and fracture of the skull was feared. Details of these cases are given, as well as of two other cases. MARSHALL.

PEARSON'S (368) patient was a child, aged two and one half years, who developed a pock on the ocular conjunctiva near the outer canthus of one eye. The eruption was also present on the mucous membrane of the mouth. MARSHALL.

BREWERTON (369) concludes as the result of the examination of upwards of 100 cases of this disease, that the risk of corneal sloughing from the actions of various micro-organisms stands in the following order: (1) streptococcus; (2) gonococcus; (3) staphylococcus; (4) diphtheria bacillus; (5) Koch-Weeks bacillus. He found that 50 % of the cases of ophthalmia neonatorum were gonorrhœal, and that the cases which got well quickly were really due to the pneumococcus. MARSHALL.

POSEY (370) by means of a circular letter obtained the views of American ophthalmologists on the subject of vernal conjunctivitis. It would appear to be a rare disease in all parts of the United States—exceedingly uncommon in New England, the Northwest, and at great altitudes in general, but occurring in the large cities once in two hundred to five hundred cases of

conjunctival disease. The frequency of occurrence the author believes to be about the same as in cities abroad. The palpebral form proved to be the most common (60 %), the associated form the next (30 %), while the circumcorneal variety was the rarest (10 %). The characteristic milky-white coloration of the conjunctiva was observed in 70 % of the cases. The majority occur between the ages of six to sixteen, being very rare after forty. Males are more frequently attacked (85 %) than females. The first symptoms appear in the Northern States in March or April, in the Southern States a few weeks earlier. Treatment is universally acknowledged to be unsatisfactory.

ALLING.

WOOD (371) advocates the removal of the tarsal cartilage (Heisrath's method [1]) in certain cases of chronic trachoma. The procedure is not recommended in recent or acute cases nor where other methods offer reasonable promise of cure. It should be confined to cases showing trachomatous infiltration with deposits in the connective tissue of the retrotarsal folds, especially if accompanied by thickening of the tarsus. It gives gratifying results also where, with atrophy of previously existing granulations in the tarsal folds, there remain deep-seated foci in the tarsus. The method of Kuhnt is employed. Wood has not seen ptosis, entropion, or corneal ulcers follow the operation. He has operated upon twenty-two cases. ALLING.

The first case operated upon by JOHNSON (372) presented a whitish-gray tumor 8*mm* by 5*mm* in size. It was situated on the cornea near the limbus. The second case was a tumor 5*mm* by 6*mm* in diameter, and at the limbus projecting somewhat over the cornea. The diagnosis of papilloma in either case was based on the fact that papilloma shows epithelium of the mucous membrane, from which it springs, more or less proliferated in regular manner with connective tissue bound together compactly to form papillæ containing blood-vessels. In epithelioma, on the other hand, the cells are in disorder, and groups are isolated from the main mass or found dipping down into the neighboring tissue. ALLING.

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[1] This operation was first described by Dr. B. A. POPE, of New Orleans, and published in vol. i., No. 1, in both the English and German editions of the ARCHIVES OF OPHTHALMOLOGY AND OTOLOGY—*Arch. f. Aug. u. Ohrenheilk.*, 1869. ED.

HENDERSON (373) relates an interesting case of a woman of twenty years, who had been coughing and losing flesh for about nine weeks. Examination showed a peculiar swelling of the right lower lid, 35*mm* in length, 15*mm* in width. The conjunctival surface presented the appearance of an exaggerated form of follicular conjunctivitis, except that the follicles seemed more deeply embedded. Through the skin there was a nodular feeling to the tumor. The pre-auricular and cervical glands on the same side were enlarged. The family history was negative. A microscopic examination revealed typical tuberculous tissue and a small number of tubercle bacilli. Confirmation was obtained by inoculation of a guinea-pig, which later died of tuberculosis. Surgical interference would have required such extensive mutilation that constitutional treatment was advised with the result that steady improvement took place, ending in complete resolution of the tuberculous mass. ALLING.

XII.—CORNEA.

374. **Trantas.** Superficial punctate keratitis in measles. *Ann. d'ocul.*, cxxx., p. 97.

375. **Schirmer.** On keratitis postvaccinalosa. *Deutsche med. Wochenschr.*, 1903, No. 51.

376. **Colasuona.** The treatment of corneal ulcers. *Neue Therapie*, i., No. 8, p. 770.

377. **Péchin.** Stellate cauterization of the cornea. *Arch. d'opht.*, xxiii., 8, p. 519.

378. **Steffens.** A contribution to the pathological anatomy of scleritis. *Klin. Monatsbl. f. Augenheilk.*, xli., 2, p. 36.

379. **Asmus.** Observations on acute cases of sclero-keratitis rheumatica. *Ibid.*, p. 194.

380. **Dodd, H. Work.** Operation for conical cornea with the galvano-cautery. *Med. Press and Circular*, Feb. 18, 1903.

381. **Harman, N. Bishop.** Knee-jerk phenomenon in interstitial keratitis (congenital syphilis), with a scheme for standardizing the variations of the phenomenon. *Ophth. Review*, Sept., 1903.

TRANTAS (374) reports on the occurrence of a superficial punctate keratitis in measles, which he has found in 76% of cases. This keratitis, which is almost always bilateral, is thought by the author to be an exanthematous eruption of the cornea, which has nothing in common with the phlyctenular erosions and ulcers of the cornea hitherto described as occurring in measles. BERGER.

SCHIRMER (375) saw in the mother of a recently vaccinated

child an intermarginal ulcer of the lid and a small central defect in the corneal epithelium with some infiltration about it. The epithelium was soon restored, but the opacity remained for a long time. The keratitis in this case was a deep-seated non-ulcerative corneal inflammation due to infection from without.

PÉCHIN (377) recommends instead of enucleation the procedure suggested by Dianoux. Beginning at the margin of the cornea, radiating furrows are burned with the thermocautery extending to the centre of the cornea, which is perforated. In a case of total staphyloma and one of buphthalmus after blennorrhœa neonatorum, he secured by this method an eyeball of normal volume. He also removed a staphyloma which had developed in a glaucomatous eye after a hypopyon ulcer. The operation, which sometimes must be repeated, is indicated in hydrophthalmic processes. It is preferable to amputation of the anterior segment, since an artificial eye is not necessary and tatooing suffices. It may be tried also in cases of painful glaucomatous and staphylomatous eyes. v. MITTELSTÄDT.

STEFFENS's (378) patient was a healthy woman of thirty-three who had suffered repeated inflammations of the left eye in the course of five years. The cornea was sclerosed at the margin, the sclera discolored, and the lens and iris markedly changed. A similar process began in the right eye with deposits on Descemet's membrane and opacities of the vitreous without external evidences of inflammation or changes in tension. The left eye was enucleated, and there was found to be severe inflammation of the sclera and ciliary body, with involvement of the remainder of the uveal tract, cornea, and vitreous. There was no actual necrosis. The author compares this girdle-shaped inflammation of the sclera with the nodular, episcleral, tuberculous, primary and secondary.

ASMUS (379) regards as characteristically rheumatic the cases of corneal affection near the limbus, causing a porcelain-white color, lying first in the parenchyma with a covering of stippled epithelium. Later a deep defect is found. The sclera is but slightly involved. The affection yields readily to salicylate of soda.

DODD (380) operates for conical cornea with the cautery in the following manner: A series of deep, punctate dots is made around the cone, but he does not touch the centre, neither does he perforate. MARSHALL.

HARMAN'S (381) paper was read at the meeting of the British Medical Association held at Swansea. It having been stated that the knee-jerk was much diminished or was absent in children suffering from interstitial keratitis as the result of congenital syphilis, Harman proceeded to investigate these cases from this point of view. The results of his researches are here given. These quite disprove the statement, for he shows, comparing 100 children with this disease with those that are healthy, there is practically no difference between them. MARSHALL.